

DOE/NASA CONTRACTOR REPORT

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SYSTEM DESIGN AND INSTALLATION FOR RS600 PROGRAMMABLE CONTROL SYSTEM FOR SOLAR HEATING AND COOLING

Prepared by

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Under Contract NAS8-32256 with

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George C. Marshall Space Flight Center, Alabama 35812

for the U. S. Department of Energy



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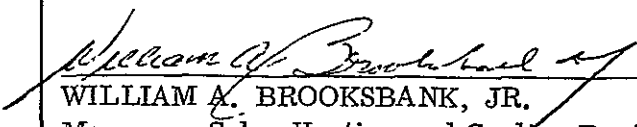
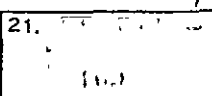

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16. ABSTRACT This document contains the installation, operation and maintenance manual, the system design drawings, installation drawings and the system design data brochure. It provides detailed information necessary for the building/purchase and installation of the RS600 Programmable Control System for solar heating, combined heating and cooling and/or hot water systems. Included are such items as general specifications, user configuration and options, displays, theory of operation, trouble-shooting procedures, parts lists, drawings, diagrams, wiring lists and warranty and assistance.		
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SECTION C	System Design Data Brochure

SECTION A

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

RS 600

PROGRAMMABLE CONTROL SYSTEM

WARRANTY AND ASSISTANCE

Unless otherwise stated Rho Sigma, Inc. warrants its products to be free from defects in material and workmanship and to perform in accordance with applicable specifications for one year from date of shipment.

Rho Sigma, Inc. will provide free factory service, including parts, labor and transportation back to the customer for any malfunction of its products which, upon authorization from Rho Sigma, are returned to the factory transportation charges prepaid. A complete description of the reason for return must accompany the unit. A nominal handling charge will be made on units for which a rejection is not verified.

Service contracts and customer assistance are available for Rho Sigma products that require on-site repair or maintenance. Unless otherwise arranged, customer pays all transportation and labor costs for on-site repair performed 31 days or more after initial system delivery. For repair assistance, contact Rho Sigma directly or any of our sales representatives.

This warranty is void if the product is subjected to misuse, neglect, accident, or improper installation or application.

CAUTION

Always turn power "off" on the RS600 PCS before inserting or removing a card or component. Never force anything, use a screwdriver or other dull instrument to remove an I. C. from the socket.

SECTION A

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1.0 SPECIFICATIONS

1.1 Introduction

The RS 600 Programmable Control System (PCS) is a highly versatile, programmable controller. The RS 600 accepts inputs from a wide variety of sensors and converts them to engineering units. Control equations, customer designated, are then solved and the appropriate outputs occur. Typical of the equations are those used in a solar heating system which include: differential temperature measurement to turn the appropriate pumps on, turning back-up systems on when solar is not enough and off-peak control for back-up systems.

The RS 600 Programmable Control System utilizes a Fairchild F8 microprocessor to perform all timing, control and calculation functions. The microprocessor follows a program which is stored on plug-in, UV erasable prom's. These prom's are changed to customize the system's performance for individual control requirements.

1.2 General Specifications

The following specifications apply in general to all RS 600's. However, the exact specifications for any unit may vary depending upon the amount of customizing or options ordered. Check Section 1.3 for User Options and Specifications.

1.2.1 Analog Inputs

Eight single ended analog input channels, expandable to 16. Reed relay analog matrix for best noise and isolation. The inputs are used for thermistor, pyranometer, flowmeters and switched inputs. Conversion rate is 8 channels/2 sec. or every channel once every .25 seconds.

1.2.1.1 Thermistor Inputs

Optional Thermistor circuit card provides reference resistors for 10,000 ohm thermistors. Standard thermistor output linearized over a range of -40°F to +300°F. Each thermistor circuit card contains 8 thermistor reference resistors and a 1.7vdc reference supply. Power supply drift is 0.02°C max. Linearization error is + 1.0°F.

1.0 SPECIFICATIONS - Continued

1.2.1.2 Analog Flowmeter Input

The analog input can accomodate an input from an analog flowmeter where 0-2vdc is representative of the flow.

1.2.1.3 Isolation

The analog inputs can directly accomodate a solar cell type pyranometer input and with an optional amplifier can also handle a thermopile type pyranometer.

1.2.1.4 Switch Closures

The analog inputs can be utilized to handle a switch closure input. To debounce the switch, its input will be scanned twice separated by 200 milsec.

1.2.2 Logic Level Inputs

Eight TTL compatible inputs expandable to 16. Logic '0' is 0+0.5vdc @ 1.6ma or a contact closure of less than 300 ohms. Logic '1' is +2.4 to +5vdc or an open circuit. Debounce be requiring 2 consecutive inputs .3 sec apart to act upon new condition. A pulse type flowmeter can also be inputed to these inputs, provided its rate is less than 240 pulses per minute.

1.2.3 Outputs

There are sixteen relay driver type outputs available internally to the PCS. These outputs can drive either solid state or contact relays to provide sixteen different control functions. The types of relays used will depend upon the customer's system requirements.

1.2.3.1 Solid State Relays

Optical coupled solid state switches are available as control outputs. They can be used to run pumps, fans, and control valves. Outputs can also be proportionally controlled. The output is 120VAC at 10 amps.

1.0 SPECIFICATIONS - Continued

1.2.3.2 Contact Relays

Contact relays are available as controlled outputs. The type used (DP/DT, SP/ST, etc.) will depend on the customer's needs.

1.2.4 Controls

RS 600 controls include an inner panel power switch and an optional front panel keyboard and a keyboard protect keyswitch.

1.2.5 Display (Optional)

Multifunction display, uses large, 0.6 inch high, broad stroke LED's for good visibility at 25 feet. For each input channel, the display shows the two digit channel number, preceded by the channel designator, [. The sequential display is the value of the channel in engineering units. The display also used for date entering and to show time and date functions. The display shows flashing time display after a power loss.

1.2.6 Internal Clock

Internal calendar clock operates for a 365 day year. User sets clock from switch at power turn-on or time can also be set from keyboard.

1.2.7 Physical

The PCS Enclosure is 20" wide x 10" deep x 30" high. Four mounting holes are on rear plane for wall mounting.

1.2.8 Environment

Operating temperature	0 to +50°C
Storage temperature	-20 to +70°C
Humidity (no condensation)	0 to 95% RH
Shock	normal handling
Vibration	normal handling

1.2.9 Power

115VAC \pm 10%, 60 \pm 3Hz, 100 watts nominal.

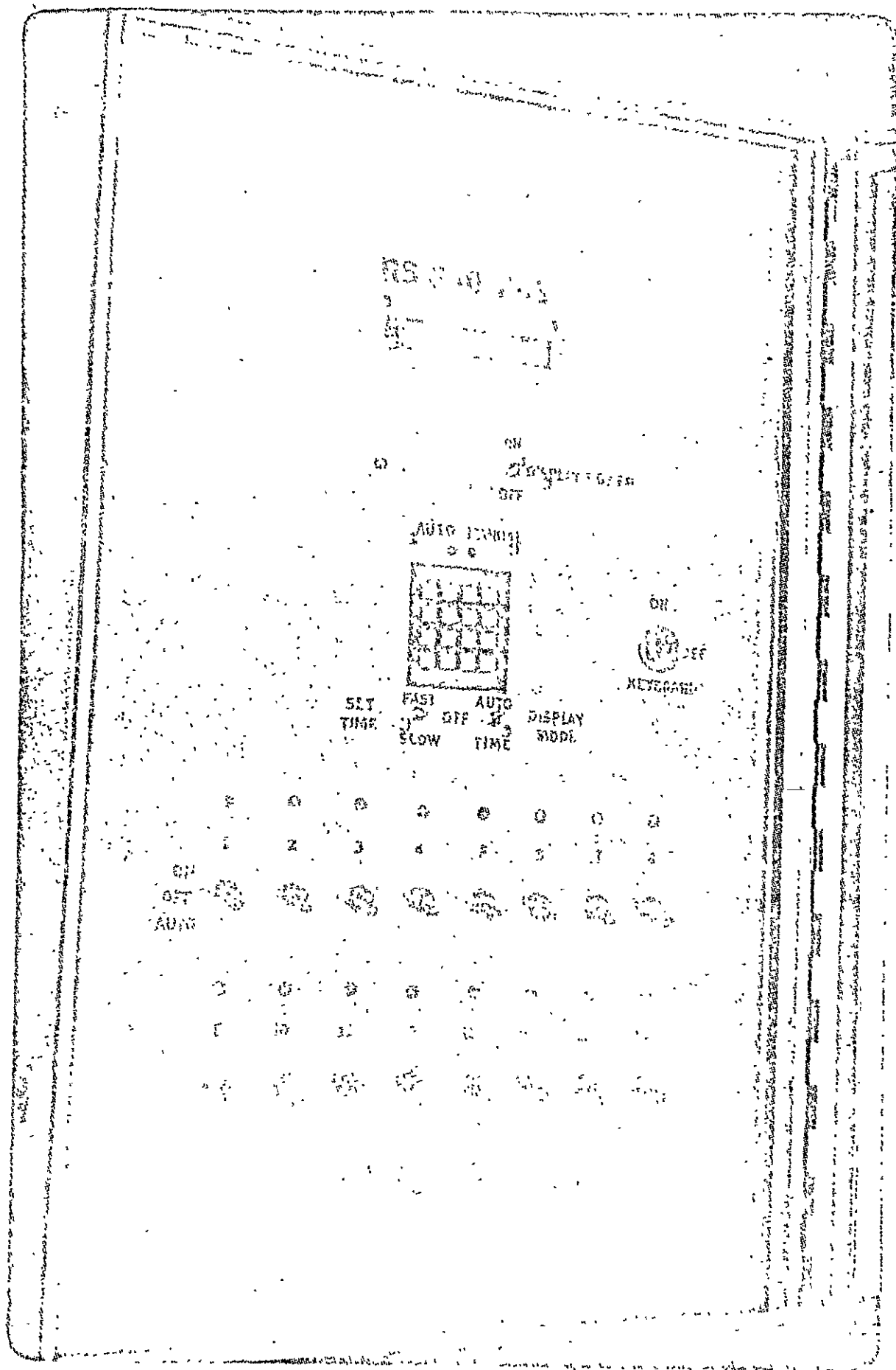


Figure 1.1
RS 600 Programmable Control System

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1.0 SPECIFICATIONS - Continued

1.3 User Configuration and Options

1.3.1 Inputs

<u>Channel</u>	<u>Type</u>	<u>Ref. Designation</u>	<u>Remarks</u>
00	01	T1	Temp Hot Tank
01		T2	Collector
02		T3	Cold Tank
03		T4	Dom. Hot Water
04		T5	Pool
05		T6	Ref.
06		T7	Spare
16		S1	Thermostat Heat
17		S2	Switch Summer/Wint
18		S3	Thermostat -Cool

1.3.2 Outputs

<u>Channel</u>	<u>Type</u>	<u>Ref. Designation</u>	<u>Remarks</u>
33	01	HCR	115 VAC
34		CCR	115 VAC
35		DWR	Contacts
36		PHR	"
37		HDR	"
38		HDB	"
39		BCR	"
40		CDR	"
41		BCRS	"

1.3.3 Constants

<u>Channel</u>	<u>Type</u>	<u>Ref. Designation</u>	<u>Value</u>
64	02	1K2	2°F
65		1K10	10°F
66		2K1	1°F
67		2K3	3°F
68		3K1	1°F
69		3K3	3°F
70		4K1	1°F
71		4K4	4°F
72		4K100	100°F
73		5K100	100°F
74	02	6K100	100°F
75		7K1	0800 (Time)
76	05	7K8	0800 (Time)
77	02	7K40	40°F
78	02	7K65	65°F
79	02	8K65	65°F
80	02	9K175	175°F
81	02	9K45	45°F

1.0 SPECIFICATIONS - Continued

1.3.4 Input Connections

RS 600 input terminal board S/N 0001 thru 0003
Date 8/27/77

<u>TB1</u>	<u>CH</u>		<u>TB6</u>	
1	00	T1	1	115VAC Black
2	01	T1	2	115VAC Ret. White
3	02	T2	3	Chassis GRD.
4	03	T2	4	
5	04	T3		
6	05	T3		
7	06	T4		
8	07	T4		
9	08	T5		
10	09	T5		
11	10	T6		
12	11	T6		

<u>TB2</u>	<u>CH</u>	
1	12	Spare
2	13	"
3	14	"
4	15	"
5	16	"
6	17	"
7	18	"
8	19	"
9	20	"
10	21	"
11	22	"
12	23	"

<u>TB3</u>	<u>CH</u>	
1		S1 GND
2	16	S1 COM
3		S2 GND
4	17	S2 COM
5		S3 GND
6	18	S3 COM
7		Spare
8		"
9		"
10		"

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1.0 SPECIFICATIONS - Continued

1.3.5 Output Connections

<u>TB4</u>		<u>CH</u>	<u>Ref. Designation</u>
1	115VAC	33	HCR
2			
3			
4	115VAC	34	CCR
5			
6			
7	K1-NC	35	PWR
8	K1-C		
9	K1-NO		
10	K2-NC	36	PHR
11	K2-C		
12	K2-NO		
13	K3-NC	37	HDR
14	K3-C		
<u>TB5</u>			
1	K3-NO	38	HDB
2	K4-NC		
3	K4-C		
4	K4-NO	39	BCR
5	K5-NC		
6	K5-C		
7	K5-NO	40	CDR
8	K6-NC		
9	K6-C		
10	K6-NO	41	BCRS
11	K7-NC		
12	K7-C		
13	K7-NO		

1.3.6 Control Equations

1.3.6.1 Heat Collection: Pump will turn on when collector temperature (T2) is 10°F greater than the hot tank temperature (T1). The turn off is at a ΔT of 2°F.

$$HCR = (T2 - T1) \geq 10^{\circ}F$$

$$\overline{HCR} = (T2 - T1) \leq 2^{\circ}F$$

$$\text{Out } 32 = \frac{\text{out } 32 \cdot \text{and} \cdot (\text{IN01} - \text{IN00} \cdot \text{GE} \cdot 1K2)}{\text{or} \cdot (\text{IN01} - \text{IN00} \cdot \text{GE} \cdot 1K10)}$$

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1.0. SPECIFICATIONS - Continued

- 1.3.6.2 Nocturnal Radiation Pump will turn on at a ΔT of 3°F and off at a ΔT of 1°F between the cold tank and collector.

$$\text{CCR} = (T3 - T2) \geq 3^{\circ}\text{F}$$

$$\overline{\text{CCR}} = (T3 - T2) \leq 1^{\circ}\text{F}$$

Out 33 = out 33.and.(IN0 -IN0 .GE.2K1).
or.(IN02-IN01.GE.2K3)

- 1.3.6.3 Solar-Domestic Hot Water: Turn circulator pump to heat exchanger on a ΔT of 3°F and off a ΔT of 1°F between hot water tank and hot tank.

$$\text{DWR} = (T1 - T4) \geq 3^{\circ}\text{F}$$

$$\overline{\text{DWR}} = (T1 - T4) \leq 1^{\circ}\text{F}$$

Out 34 = out 34.and.(IN0 -IN03.GE.3K1).
or.(IN00-IN03.GE.3K3)

- 1.3.6.4 Solar-Swimming Pool - Open valve to heat exchanger when ΔT between pool and hot tank is 4°F and off when ΔT is 1°F . Also, heat will not be extracted for the pool if the hot tank is below 100°F or the pool is above the reference temp. that is settable from an inner panel potentiometer.

$$\text{PHR} = [(T1 - T5) \geq 4^{\circ}\text{F}] \quad T1 > 100^{\circ}\text{F} \quad [T5 < T6]$$

$$\overline{\text{PHR}} = (T1 - T5) \leq 1^{\circ}\text{F} \text{ and } T5 \leq T6$$

Out 35 = out 35.and.(IN00-IN04.GE.4L1).
and. (IN014 .LE. IN015).
or.(IN00-IN0 .GE.4K4).and.(IN00.GE.4K100)
and (IN04.LE.IN05).

- 1.3.6.5 Solar-Heat Distribution: The hot tank will be used for heating if heat is required and the H.T. is above 100°F .

$$\text{HDR} = S1 \cdot (T1 > 100^{\circ}\text{F})$$

Out 36 = IN16.and.(IN00.GT.5K100)

1.0 SPECIFICATIONS - Continued

- 1.3.6.6 Back-Up Heat-To-Heat Distribution: Turn on back-up supply if the H.T. is less than 100°F.

HDB = S1 . (T1 \leq 100°F)

Out 37 = IN16.and.(IN00.LE.6K100).

- 1.3.6.7 Back-Up Chiller: Cools cold tank (C.T.) if the C.T. temperature is greater than 65°F, cooling will be needed, and time is not in the peak loading hours. Tank will be cooled to 40°F.

BCR = (T3 \geq 65°F) S2.(0.00 \geq t \leq 0800).
(T3 \geq 40°F)

Out 38 = (IN02.GE.7K65)OR.OUT38.and.
(IN02.GE.7K40).and.IN17.and.

(TIME.GE.7K1.).and.(TIME.LE.7K8).

- 1.3.6.8 Cool Distribution: Turns on if cold tank is below 65°F and "cool" is required.

CDR = S3 and (T3 $<$ 65°F)

Out 39 - IN18.AND.(IN02.LT.8K65)

- 1.3.6.9 Back-Up Chiller (Solar Assist): The absorption chiller will use solar if collector temperature is 175°F or greater, the cold tank is above 45°F and cooling will be required.

BCRS = (T2 \geq 175°F) . (T3 $>$ 45°).S2

Out 40 = IN1 .and.(IN01.GE.9K175).
and.(IN02.GT.9K45)

2.0 INSTALLATION

2.1 Unpacking.

Although the RS 600 PCS is a rugged instrument, care must be exercised to properly package the instrument for shipment to avoid damage in transit. When shipped from the factory, the unit was packaged with sufficient inserts and foam padding to cushion the shock and vibration normally encountered in transit.

2.0 INSTALLATION - Continued

2.1 Unpacking - Continued

When the unit is received, examine the shipping container for evidence of damage. If none found, unpack the unit carefully, watching for signs of damage. If evidence of any damage is found, notify Rho Sigma and the carrier immediately. Rho Sigma will start the necessary repair or replacement process immediately without waiting for the carrier to settle the damage claim.

Verify that the contents match the enclosed shipper and that there are no shortages or over shipments. Compare the serial and model numbers in the front of the manual against those on the nameplate on the rear of the unit. Notify Rho Sigma immediately of any shipping errors or discrepancies. Check all printed circuit cards to be sure they are completely plugged in prior to applying power to the unit.

2.2 Mounting

1. The standard RS 600 PCS is delivered in it NEMA 12 type cabinet and is for wall mounting. The hanging instructions are enclosed in the NEMA cabinet.
2. Connect power cord, cables, sensor inputs and controlled outputs as shown in Figure 1.3.

Although the RS 600 PCS does not require an air conditioned environment, do not place it where it will experience wide temperature changes or undue heat rise.

2.3 Repacking, Returning The Instrument

Notify Rho Sigma prior to returning the instrument to obtain return approval. If the unit is to be shipped by common carrier, it must be packed so that there is a minimum of 2 inches of packing material or space between the unit and the shipping case or carton. Include any cabling and auxiliary devices necessary to recreate the problem to be fixed. Also include your name, phone number, extension and a written description of the problem. This information will assist Rho Sigma in making a prompt and accurate repair of the unit.

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2.0 INSTALLATION - Continued

2.4 Power Connections

The RS 600 PCS is designed to operate on 115VAC, 60Hz power. Any deviations from this type of power will damage the unit. To use, connect the supplied power cord to an outlet with an ampere capacity of 20 amps.

2.5 Sensor Input Connections

All sensor input connections are made on terminal strips or connectors mounted on the top of the inner panel. Refer to Section 1.3 for the exact input pin or terminal number designations. Use the following instructions to connect sensors to the PCS.

2.5.1 Thermistors

The PCS uses two wires to measure the resistance of 10K ohm thermistors. On units equipped with terminal strips, connect one side of the thermistor to Terminal 1, the other side of the thermistor to Terminal 2 for the appropriate input channel.

2.5.2 Voltages

Voltage outputs from sensors or other sources may be connected directly to the RS 600. Connect voltages only to those pins specifically designated as voltage inputs in Section 1.3.4. Use shielded lines for voltages less than 100mv full scale or on voltages less than 200mv full scale if the line length exceeds 25 feet. The RS600 can monitor D.C. voltage.

2.5.3 Pulse Inputs (non-isolated)

Pulse inputs from flow sensors, counters, etc., may be connected directly to the RS 600 discrete inputs. All pulse inputs should be as specified in Section 1.2. A series dropping resistor or other technique should be used to reduce the amplitude of pulses greater than +5 volts peak. Pulses with amplitudes less than 2.5 volts should be amplified to assure consistent and accurate readings. Input frequency should not exceed 240 pulses per minute. Connect the positive sensor output line to the RS 600 + Flow

2.0 INSTALLATION - Continued

2.5.3 Pulse Inputs (non-isolated) - Continued

inputs, the negative sensor lead to - Flow input or Flow return.

2.5.4 Discrete Inputs

Contacts or voltage levels may be used as the source of discrete input levels for the RS 600 PCS. Controls may be SPDT or SPST type, switching between open and ground. Maximum contact resistance is 300 ohms. Connect arm to contact input, normally open contact to PCS contact common. Voltage inputs are similar to contacts. Input voltage levels should not be more positive than +5VDC or less than -0.5VDC. Shielded leads are not required for the discrete inputs.

2.6 Outputs

All control outputs are made on the terminal strips or connectors mounted on the bottom of the front panel. Refer to Section 1.3 for exact output pin or terminal number designations. Use the following instructions to connect the output controls to the PCS.

2.6.1 Solid State Relay

The output will be 120VAC when on and can be proportional. Connect the device requiring 120VAC control to two terminal designated in Section 1.3.

2.6.2 Contact Relays

The PCS uses double throw contact relays so that the terminals for each relay will be NC-C-NO. Wire the terminals to the appropriate contact in accordance with Section 1.3.

3.0 OPERATION

3.1 Controls

Controls for the RS 600 PCS consists of a keyboard (optional), a time set switch, a display mode switch, a keyboard enabling switch and a display on/off switch (optional). The controls perform the following functions:

3.0 OPERATION

3.1 Controls - Continued

POWER ON/OFF	Front panel toggle switch that applies 115 VAC power to the system.
KEYBOARD ON/OFF	Front panel key switch than enables the RS 600 keyboard when ON. OFF position disables all keyboard inputs.
KEYBOARD	Inner panel keyboard is grouped into two major functions: numeric data and auxiliary functions. The operator uses combinations of the various keys to control the RS600 PCS. Paragraphs 3.1.1 thru 3.1.4 describe the keyboard functions.
SET TIME FAST/SLOW	Switch will advance time in hours and minutes at either a fast or slow rate. Operator activates switch down until correct time is reached and then releases switch.
DISPLAY MODE	Sets the RS 600 display to either a sequential or time display
DISPLAY ON/OFF	Enables the display to function or disables.
OUTPUTS ON/OFF/AUTO	Manual override switch for all outputs. Switch for each channel will either turn the output on or off or place it under computer control (auto).

3.1.1 Numeric Keys

The numeric keys include ten numbers 0 thru 9.

Ten numbered keys that cause their respective number to appear in the active portion of the PCS display.

3.0 OPERATIONS - Continued

3.1.2 Auxiliary Functions

The auxiliary function keys are the alpha keys A thru F.

<u>Key</u>	<u>Function</u>	<u>Description</u>
A	Clear/reset	Sets PCS to normal sequence mode.
B	Enter	Causes the RS 600 to execute any display request or store the data entered.
C	Time	Designates the next numeric key as a time category.
D	Channel	Designates the next numeric key as a channel number.
E	Delimiter	Used in "entering data" mode.
F	Clear Entry	Clears last entry mode.

3.1.3 Time Category

C	Time	Designates the next numeric key as a time category. Time categories are: P 1. Seconds 2. Hours and Minutes 3. Day of Year 4. Manual Mode (equations not being solved) 5. Auto mode
---	------	---

3.1.4 Keyboard Control Examples

3.1.4.1 Display Time

To display any time parameter press the following keys:

C (TIME) P,B (ENTERED)

└ Time category code, 1 thru 5

3.0 OPERATION - Continued

3.1.4.2 Time Set

To set a time parameter, press the following keys:

C (TIME), P, ENNNN, B (ENTER)

└─ 2 or 4 digits

└─ Time category code, 1 thru 3

3.1.4.3 Display a Data Channel

To display an input/output channel or a constant, press the following keys:

D (CHANNEL), NN, B (ENTER)

└─ 2 digit channel number, 01 thru 99

0 - 31 input channels

32 - 47 output channels

48 - 99 constants

3.1.4.4 Enter Data

To change a constant or set-or-reset an output:

D (CHANNEL), NN, E(delimiter), XXXX, B(ENTER)

└─ 2 digit channel number

32 - 47 output channel

48 - 99 constant

XXXX

Output

0 = reset

200 = set

Constant

0-9999 = positive integers

32768-65536 = negative integers
(65536-N)

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3.0 OPERATION - Continued

3.2 Displays

RS 600 PCS has a multi-function display. The display is used to show time parameters, data channels, data units and to verify operator keyed-in data prior to its entry into the system. The display is continually serviced by a refresh program that updates the display at preset rate. To freeze or hold any value, use the keyboard to enter a display request as shown in 3.1.5.1 or 3.1.5.3. Press A(CLEAR) to resume the prior display operation.

For data, the display shows a two digit channel number, then sequences to a value of XX +.1999. For time, the display shows a two or four digit number with a colon for hours: minutes. Seconds appear as a two digit number.

3.2.1 Display Symbols

The display utilizes symbols to designate the units and type of display shown. The symbols and their description are:

<u>Symbols</u>	<u>Data</u>	<u>Description</u>
[Channel
□		Temp. (°F or °C)
U		Isolation (BTU)
F		Flow rate-analog input
HI		Input at +5VDC level
LO		Input at GND level
P		Flow rate-D pulse input (GPM)
A		Constant
+ □		Time, day of year 0-364
+ H		Time, hours:min.
+ S		Time, seconds
E		Equation syntax error

3.3 Initialization Procedure

3.3.1 Pre Operation Setup

Connect outputs and inputs to terminal strips per Section 2.5. & 2.6.

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3.0 OPERATION - Continued

3.2.2 Operation

Turn on POWER switch. Display should show a flashing display of + H XX:XX. Set internal calendar clock by Keying in:

C(TIME) 2,HHMM, B(ENTER) for Time //X hours:minutes

C(TIME) 3,DDD,B(ENTER) for Day of Year

The outputs can be set or reset via the keyboard. Section 3.1.4.4 explains the correct operation.

4.0 THEORY OF OPERATION

4.1 Block diagram Description

Figure 2 is the Block Diagram for the control section of the PCS. The inputs, both analog and discrete are multiplexed onto the common buss. The analog inputs are digitized by the A/D converter. The F8 microprocessor controls the inputs, outputs and all timing functions via the program stored in memory (4K Prom). The memory (1K RAM) is used for temporary storage by the F8. The keyboard communicates to the F8 via the common buss and the display is utilized by the F8 via the common buss.

4.2 Program Concept

A separate manual is available ^{for} ~~from~~ Rho Sigma of the complete program stored in the Prom's.

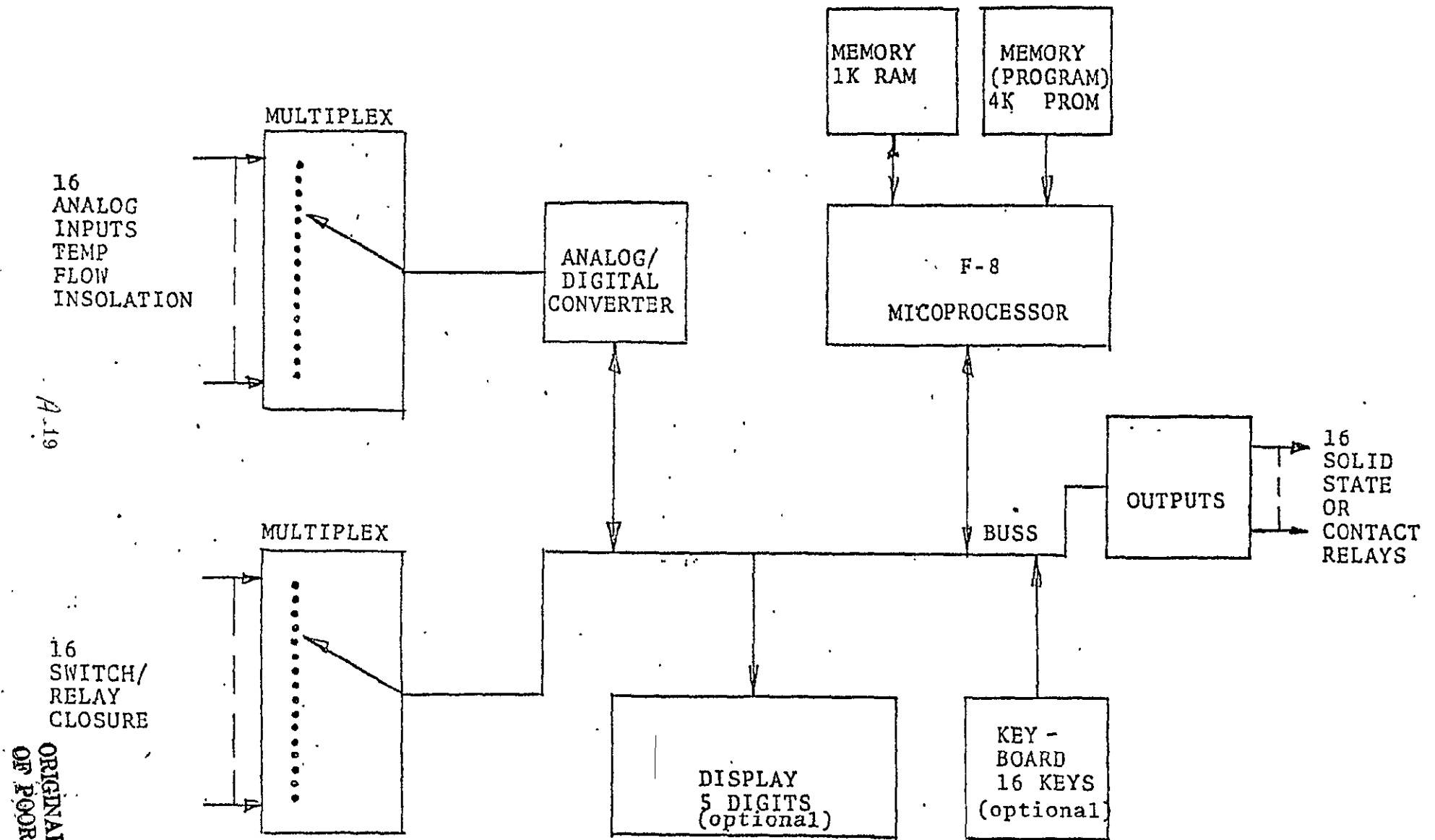


Figure 2.1..

PROGRAMMABLE CONTROL SYSTEM

5.0 MAINTENANCE

5.1 Introduction

This section describes the maintenance and troubleshooting procedures for the RS 600 PCS. Section 5.4 is an overview of the troubleshooting procedure to be followed in the event of a field failure.

5.2 Reference Designations

The RS 600 PCS is assembled on a single chassis as shown in Figure 5.2. Each PC card of sub-assembly has its own set of partial reference designators that refer only to the components on that particular sub-assembly. The same reference designator number may be repeated on different assemblies. All components on schematics, assembly drawings and schematics are cross referenced by partial reference designators. No attempt has been made to assign reference designators so that a connector on one assembly mates with corresponding numbered plug on another assembly. However, mating cable connectors are tagged "Mates to J" to aid in system assembly.

5.3 Calibration and Maintenance

Perform the calibration and maintenance listed below if necessary.

The instructions in Section 5.3 require that the calibrator be a qualified technician and has the following equipment available to him:

1. Oscilloscope, Tektronix Model 545 or equivalent.
2. DVM, 4 1/2 digist, 10uv resolution, accurate to 50uv.
3. Resistance standard with 0.1 ohm steps, accurate to 0.01 ohms.
4. Optional display and keyboard assembly if not on PCS.

The following basic instructions are to be followed when performing any of the calibration procedures. Always turn power off before inserting or removing a component or card. Never force anything. Use a screw drive or other dull instrument when removing an IC from a socket. Review the proper schematic before plunging into the calibration procedure. Be sure you have a good knowledge of the RS 600 PCS and its operation before starting.

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5.0 MAINTENANCE - Continued

5.3 Calibration and Maintenance - Continued

TABLE 5.3 PERIODIC MAINTENANCE CHART

<u>UNIT</u>	<u>PERIOD</u>	<u>MAINTENANCE</u>
+5V Pwr Sup	1 yr.	Adjust to 5.0 \pm .1VDC
+12 Pwr Sup	1 yr.	Adjust to +12.0 \pm .1VDC
Universal Board	1 yr.	Adjust to +1.70 \pm .01VDC

5.3.1 Power Supply Adjustments

The RS 600 power supplies are adjusted in the following manner: Install an extender card in the chassis. Measure the power supply voltages on the extender card. (See 5.4 for connector pin layout). Use an insulated shaft screwdriver to avoid shorting the supply's regulator. Use a short screwdriver or a right angle driver to adjust the +12 & +5V supply. By turning VADJ on the appropriate power supply, adjust R1 on the universal board to get proper voltage on J1-B12.

5.4 Troubleshooting Procedures

This section describes procedures for locating circuit malfunction. It is assumed that all power supplies are properly functioning and there is only one malfunction in the unit. For multiple failures, use this guide to isolate one of the failures. Repair it and continue to find the remaining failures.

Troubleshooting can be broken down into fault isolation and repair. Successful fault isolation in a microprocessor based system requires a good understanding of the system's operation to determine whether the fault lies in the microprocessor proper or somewhere else in the system.

Due to the complex nature of a microprocessor based system, the conventional troubleshooting procedures will only find gross faults. Subtle errors can only be found with a good knowledge of the units program and a Program Analyzer. Before attempting any repairs, review the following manual sections:

Sections 1.0, 3.0 and 4.0
Section 5.5

5.0 MAINTENANCE - Continued

5.4 Troubleshooting Procedures - Continued

Repair consists of changing a card or component to put the unit back into operation. Consult the spare parts list, Section 6.0, when ordering any module, component or front panel replacement part.

As a guide, the basic fault isolation procedure for the unit is shown in Table 5.4. However, if obvious fault symptoms are present, skip the elementary fault-isolation steps and proceed directly to a diagnosis and repair of the fault area.

WARNING

If the fault-isolation procedure requires internal measurements, always remove power when disassembling or assembling the unit. Use extreme caution during troubleshooting, adjustment, or repair to prevent shorting components and further damage to the unit.

5.5 Logic Conventions

The unit uses positive logic, which means the normally active or high signal state is $+3.5 \pm 1$ volts and the inactive or low state is 0.0 ± 0.5 volt. The high state is referred to a logic 1 and the low state is logic 0. The terms true and false relate to the signal being in or out of its active state and normally correspond to logic 1 and 0.

Complements of signals are indicated by an F or N suffix or by an inversion dot on the logic symbol. Complemented signals are always low when the original signals are high and vice versa. See Figure 5.5 for the standard logic symbols.

TABLE 5.4 FAULT ISOLATION STEPS

<u>SYMPTOM</u>	<u>POSSIBLE FAULT</u>	<u>CHECK</u>
Initial Turn-On No operation		Loose control panel cable. Push cables into sockets on cards. Blown fuse

5.0 MAINTENANCE - Continued

TABLE 5.4 FAULT ISOLATION STEPS - Continued

<u>SYMPTOM</u>	<u>POSSIBLE FAULT</u>	<u>CHECK</u>
Flashing "Time"	Power Failure	Reset Times 2,3 and 4
Wrong Readings	Input fault	Check input connections. Use display to read inputs. Check input with DVM.
	Wrong Units	Check units assigned to channel.
	Flow channel error.	Check flow counter with scope or analyzer. Replace card.
	Discrete error	Check input gate. Check input for proper voltage swing.
Wrong Calculations	Wrong equation	Check Section 1.3.6.
Display	Defective LED or LED Driver	Check logic and signals on PCS Display Card.
	Defective output latch	Check latch output signals on card.

6.0 PARTS LIST AND LOCATION

6.1 Introduction

This section contains all information necessary to locate, identify and order parts. The listing of parts and information for an exact replacement is shown on pages 28 thru 49. Major sub-assembly locations are shown in Figure 5.2. All component locations are identified by reference designators in the parts list or upon their mounting surface.

6.2 Replacement Parts

6.2.1 Standard Parts

All parts can be purchased directly from Rho Sigma Inc. at current market price, plus a

6.0 PARTS LIST AND LOCATION - Continued

6.2.1 Standard Parts - Continued

handling charge. However, since most parts are standard electronic components, it is suggested that they be secured locally for prompt replacement. The parts list gives all pertinent information including the recommended manufacturers. Where not noted, equivalent parts meeting the original part specifications may be substituted. A list of manufacturers by abbreviations may be substituted.

6.2.2 Special Parts

Parts marked with a Rho Sigma part number should be procured directly from Rho Sigma. These parts are manufactured or selected to satisfy specific requirements. Substitution of other parts might not yield equivalent performance and will void any warranty.

6.3 Parts List

The parts lists contains all components and sub-assemblies that make up the system. Subsequent tables break the major sub-assemblies down to the component level.

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FAIRCHILD LIST OF MATERIAL

PAGE 1 OF 1

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY	CHK	MFG	ENG	DATE
9,74,70,106		-03	0,1	0,1	0,1	ASSY EPROM BD					
ITEM	PART NO	REV	QTY PER ASSM	U M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT				
							REV	EN	NO		
001	40048469		001	EA	PCB EPROM BD						
002	03291040		002	EA	CAP .1UF	C3, C7					
003	03279100		002	EA	CAP 10UF 15V	C2					
004	03282560		001	EA	CAP 22UF 15V	C1					
005	26901040		004	EA	DIODE 1N914	D1A,2A,3A,4A OR D1B,2B,3B,4B					
006											
007	02354850		001	EA	RES 10K, 1/4W, 5%	R5					
008											
009											
010			001	EA	RES 3.9 Ω 1/4W 5%	R4					
011											
012											
013											
014			001	EA	DIODE ZENER 1N5231 5V	D2					
015	26905022		004	EA	IC 2708 UV PROM	U1 THRU U4					
016											
017	26905559		001	EA	IC 74LS138	U6					
018	26904816		001	EA	IC 4049	U8					
019			001	EA	CARD EJECTOR, SAE 6200	A-33					

PAGE 1 OF 1

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY	CHK	MFG ENG	DATE
8,25,40,5,2,0 -03		03	0,1,0,1	4 1/2	AC DPM ASSY CONN(2V)		7-3	1-12	0-11	
DATE	12/6/76	DATE		ENGR		DATE				
ITEM	PART NO	REV	QTY PER ASSY	U M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOC			
							REV	IN		
001	97400312	03	001	EA	ASSY BASE BD CONN	N/A	03	69		
002	97400309	03	001	EA	ASSY ANALOG BD(2V)	N/A				
003	97400402	03	001	EA	ASSY DISPLAY BD 4 1/2	N/A				
004	97401055	03	001	EA	ACCESSORY KIT 4 1/2 CONN	N/A				
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LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY	CHK	MFG ENG	DATE
37470103		-03	01	01	01	ASSY INPUT CARD 1,2				
ITEM	PART NO	REV	QTY PER ASSM	U	M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE	DOCUM	REV
001	40048465		001	EA	PCB INPUT CARD					
002	03291040		001	EA	CAP .1UF	C1				
003	03282560		001	EA	CAP 22UF, 15V	C2				
004	03279100		001	EA	CAP 10UF, 15V	C3				
005	26901040		008	EA	DIODE 1N914	D1 THRU D8				
006	05036850		008	EA	RELAY	K1 THRU K8				
007	26904575		002	EA	IC 9LS05	U2, U3				
008			001	EA	IC 3861	U1				
009			004	EA	IC 75451	U4, 5, 6, 7				
010			001	EA	CARD EJECTOR, S.A.E. 6200					
011	09917022		001	EA	SOCKET 40 PIN	U1				
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LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY	CHK	MFG ENG	DATE
9,7,4,7,0,1,0,4		-03	0,1	0,1	0,1	ASSY OUTPUT CARD 1,2				
ITEM	PART NO	REV	QTY PER ASSM	U M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUME			
							REV	EN NO		
001	40,0,4,8,4,6,6		0,01	EA	PC B OUTPUT CARD					
002	03291040		0,01	EA	CAP :1UF	C1				
003	03282560		0,01	EA	CAP 22UF, 15V	C2				
004			0,01	EA	IC F40175	U1, U4				
005	269,05559		0,01	EA	IC 9LS138	U2				
006	269,04593		0,01	EA	IC 9LS133	U3				
007			0,04	EA	IC 3611 NAT. SEMICON.	U6, U7, U8, U9				
008	269,04564		0,01	EA	IC 9LS04	U5				
009	269,01040		0,08	EA	DIODE 1N914	D1 THRU D8				
010			0,01	EA	CARD EJECTOR, S.A.E.6200					
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FAIRCHILD LIST OF MATERIAL

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LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY	CHK	MFG ENG	DATE
97,47,01,08		-03	01	0101	ASSY A/D CONTROL CARD					
							DATE	DATE	ENGR	DATE
ITEM	PART NO	REV	QTY PER ASSM	U M	DESCRIPTION	REFERENCE DESIGNATION				CHANGE DOCUM
										REV EN N
001	40,048,471		001	EA	P.C.B. A/D CONTROL CARD					
002	26905090		001	EA	IC 3851 PSU	U1				
003	26904564		001	EA	IC 74LS04	U2				
004	26904578		001	EA	IC 74LS00	U3				
005	26904590		001	EA	IC 74LS02	U4				
006	26905601		001	EA	IC 9602	U5				
007	26905605		003	EA	IC 75451	U6, U7, U8				
008	26901040		006	EA	DIODE 1N914	D1 THRU D6				
009	26012550		001	EA	ZENER 1N758A, 10V, 5%	D7				
010	26901016		001	EA	ZENER 1N4569, 6.4V, 5%	D8				
011	05036850		006	EA	RELAY	K1 THRU K6				
012	03291040		001	EA	CAP .1 μ F	C1				
013	03282560		001	EA	CAP 22 μ F, 15V	C2				
014	03279100		001	EA	CAP 10 μ F, 15V	C3				
015	03291850		001	EA	CAP .05 μ F	C4				
016	03870001		003	EA	CAP 1 μ F	C5, C6, C7				
017	02354850		003	EA	RES 10K, 1/4W, 5%	R5, R6, R7				
018			001	EA	RES 235 Ω , 1%, 50PPM	R1				
019			001	EA	RES 2.4K, 1%, 25PPM	R2			A40	

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LM NO	REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY	CHK	MFG	ENG	DATE
374.70.1.0.1	-03	01	01	ASSY MOTHER BD						

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FAIRCHILD LIST OF MATERIAL

PAGE 1 OF 2

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY	CHK	MFG ENG	DATE
97470100		-03	01	01	01	ASSY CPU BD				
ITEM	PART NO	REV	QTY PER ASSM	U M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE OCCUREN			
							REV	EN	NO	
001	40048472	01	001	EA	PCB CPU CARD					
002	26905090	01	001	EA	IC 3851	U1				
003	26904805	01	001	EA	IC 3850	U2				
004	26905407	01	001	EA	IC MC1489	U3				
005		01	001	EA	IC 4066	U4				
006	26904823	01	001	EA	IC 4001	U5				
007	02354380	01	004	EA	RES 100Ω 1/4W 5%	R2,3,4,7				
008	02354620	01	002	EA	RES 1KΩ 1/4W 5%	R8,12				
009	02354780	01	001	EA	RES 5.1K 1/4W 5%	R10				
010	02354850	01	003	EA	RES 10K 1/4W 5%	R1,6,9				
011	02355330	01	001	EA	RES 1MΩ 1/4W 5%	R13				
012	03175060	01	002	EA	CAP 10PF	C5,6				
013	02379120	01	001	EA	CAP .22UF 35V TANT	C4				
014	03291040	01	001	EA	CAP .1UF CERAMIC	C2				
015	03855004	01	001	EA	CAP .47UF CERAMIC	C7				
016	03279100	01	002	EA	CAP 10UF 15V TANT	C3				
017	03282560	01	001	EA	CAP 22UF 15V TANT	C1				
018	26006930	01	001	EA	DIODE FDH600	D1				
019	26903006	01	002	EA	TRANSISTOR ZN3904	Q1,2				

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FAIRCHILD LIST OF MATERIAL

PAGE 1 OF 1

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY <u>KAC</u>	CHK	MFG ENG	DATE
97470111		-03	01	01	01	DISPLAY CARD	DATE <u>5/77</u>	DATE	ENGR	DATE
ITEM	PART NO	REV	QTY PER ASSM	U M	DESCRIPTION	REFERENCE DESIGNATION		CHANGE DDCUM		
								REV	EN	NO
001	40048491	01	001	EA	PCB DISPLAY CARD					
002	03291040	01	004	EA	CAP .1MF CERAMIC	C1,2,3,4				
003	03282560	01	001	EA	CAP 22MF 15V TANT	C5				
004		01	001	EA	DIODE 1N4002	D1				
005	26901040	01	002	EA	DIODE 1N914	D2,3				
006		01	002	EA	RES 9.1 Ω 1/2W 1%	R20,21				
007	02354140	01	003	EA	RES 10 Ω 1/4W 5%	R17,18,19				
008	02354400	01	006	EA	RES 120 Ω 1/4W 5%	R1,2,3,10,11,12				
009	02354420	01	007	EA	RES 150 Ω 1/4W 5%	R4,5,6,7,8,9,13				
010		01	006	EA	IC 4042	U9,10,11,12,13,14				
011	26904820	01	004	EA	IC 4511	U4,5,6,7				
012		01	001	EA	IC 9667	U2				
013		01	001	EA	IC 74LS42	U8				
014	26904594	01	001	EA	IC 7414	U1				
015		01	001	EA	IC 82S23 OR EQUIVALENT	U3 - PROM CODE #6177-				
016	26905223	01	004	EA	LED FND560	DS3,4,5,6				
017	26905224	01	001	EA	LED FND567	DS2				
018	26905225	01	001	EA	LED FND568	DS1				
019	26903502	01	003	EA	TRANSISTOR 2N3906	Q1,2,3				
020		01	004	EA	SWITCH TOGGLE	SW1,2,3,4				
021		01	001	EA	CARD EJECTOR, S.A.E. 6200					

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FAIRCHILD LIST OF MATERIAL

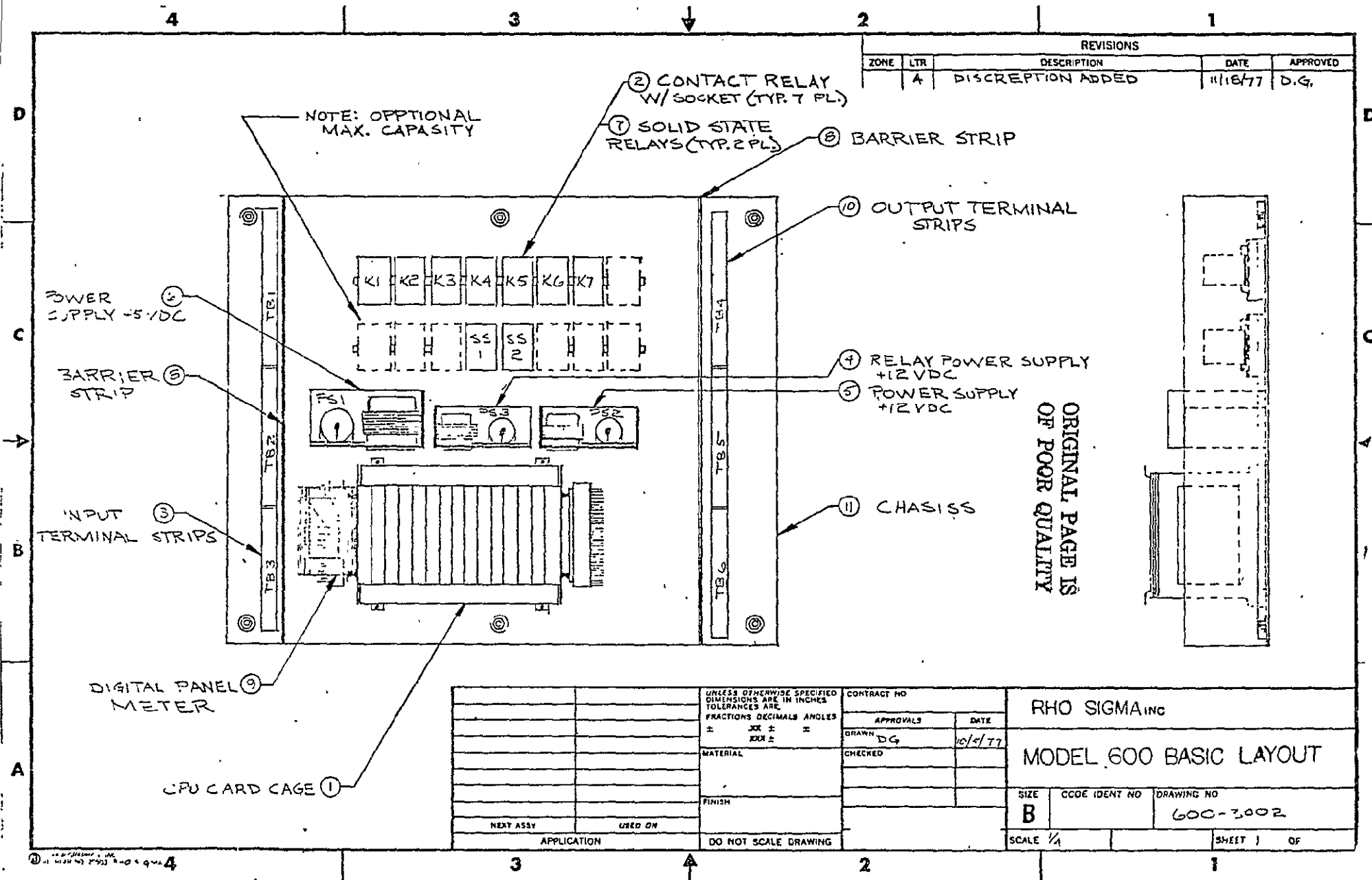
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97470112	-03	01		KEYBOARD ASSY					
ITEM	PART NO	REV	QTY PER ASSM	U M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE OCCURS	REV	EN NO
001	269048537	01	001	01	PCB KEYBOARD				
002	26905605	01	001	01	IC 75451	QA1			
003		01	001	01	IC 74C922	QA2			
004	26904816	01	001	01	IC 4049	QA3			
005	26904823	01	001	01	IC 4001	QA4			
006	03291040	01	002	01	CAP .1UF CERAMIC DISC	C1, 3			
007	03282560	01	001	01	CAP 22UF 15V TANT.	C2			
008		01	001	01	CAP 5.6UF TANT	C4			
009		00	002	01	LED, RED	DS1, 2			
010	09917009	01	001	01	SOCKET, IC, 16PIN DIP	J1			
011		01	001	01	SWITCH SPDT, TOGGLE	SW1			
012		01	001	01	SWITCH SPDT, TOG, CENTER OFF	SW2			
013	02354400	01	002	01	RESISTOR, 120-1/4 5% CMB.	R1, 2			
014		01	001	01	KEYBOARD, DIGITRAN-KL	0042			
015		01	001	01	LED, GRN	DS			
016		01	001	01	RESISTOR 15K 1/4W 5%	R3			
017		01	001	01	CAP. .001UF CER.	C5			
018									
019									
A49									

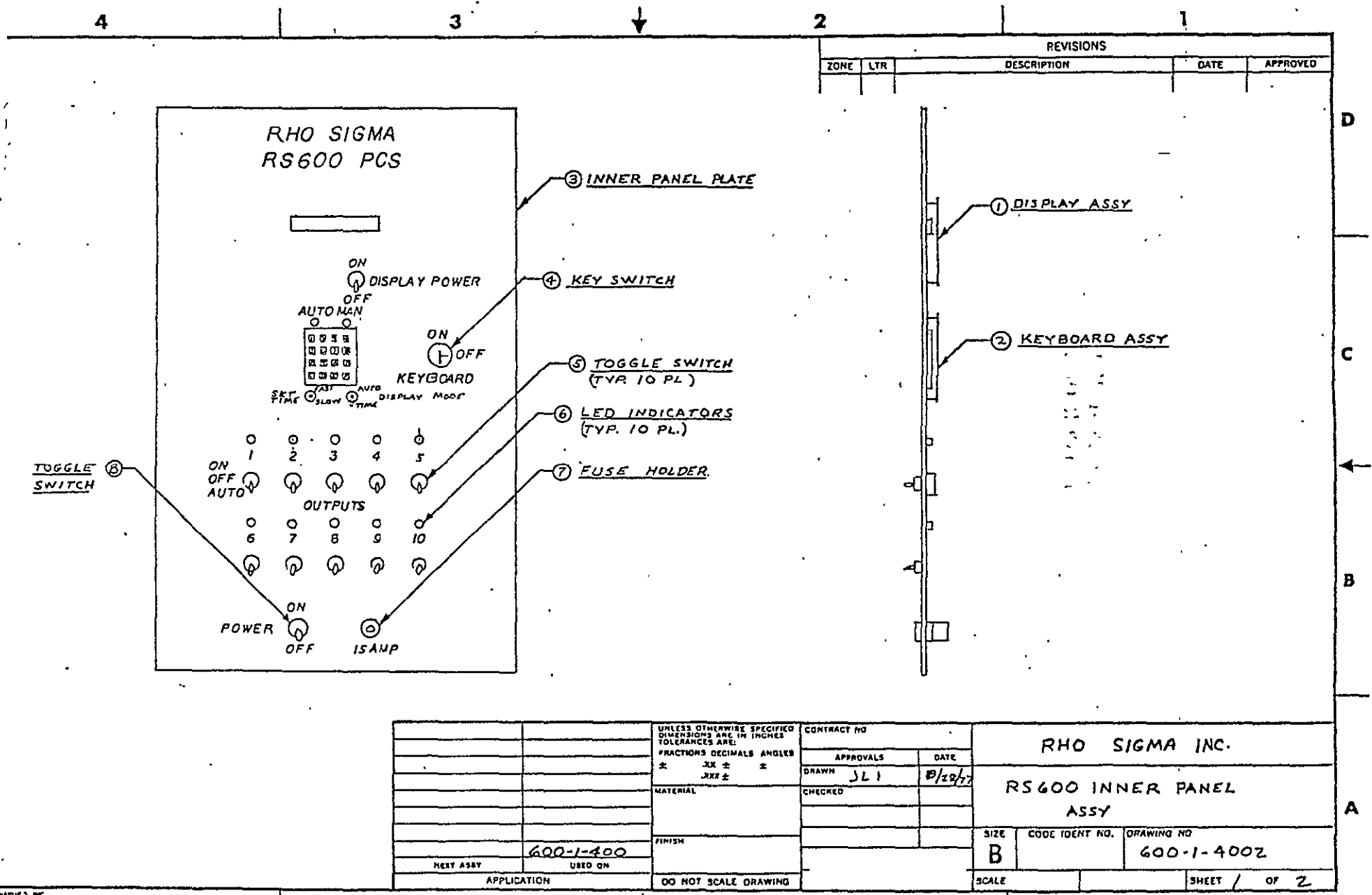
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DRAWINGS, SCHEMATICS AND WIRING DIAGRAMS

This section includes the following figures:

Page No.	51	RS 600 Chassis Assy.
	52	RS 600 Inner panel assy.
	53	RS 600 System wiring diagram
	54	Mother board assy.
	55	Input sig. cond. schematics
	56	Input card
	57	A/D Control card schematics
	58	DPM Interface card schematics
	59	CPU Card schematics
	60	Display driver card schematics
	61	Memory Address card schematics
	62	4K EROM card schematics
	63	Output card schematics
	64	Keyboard card schematics

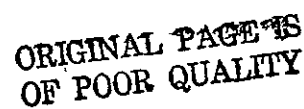




REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES * XX ± * JXX ±		CONTRACT NO.		RHO SIGMA INC.		
		APPROVALS	DATE			
		MATERIAL	DRAWN JLI	B/28/77	RS600 INNER PANEL ASSY	
		FINISH	CHECKED			
600-1-400	600-1-400		SIZE B	CODE IDENT NO.	DRAWING NO. 600-1-400Z	
APPLICATION	DO NOT SCALE DRAWING	SCALE	SHEET / OF 2			

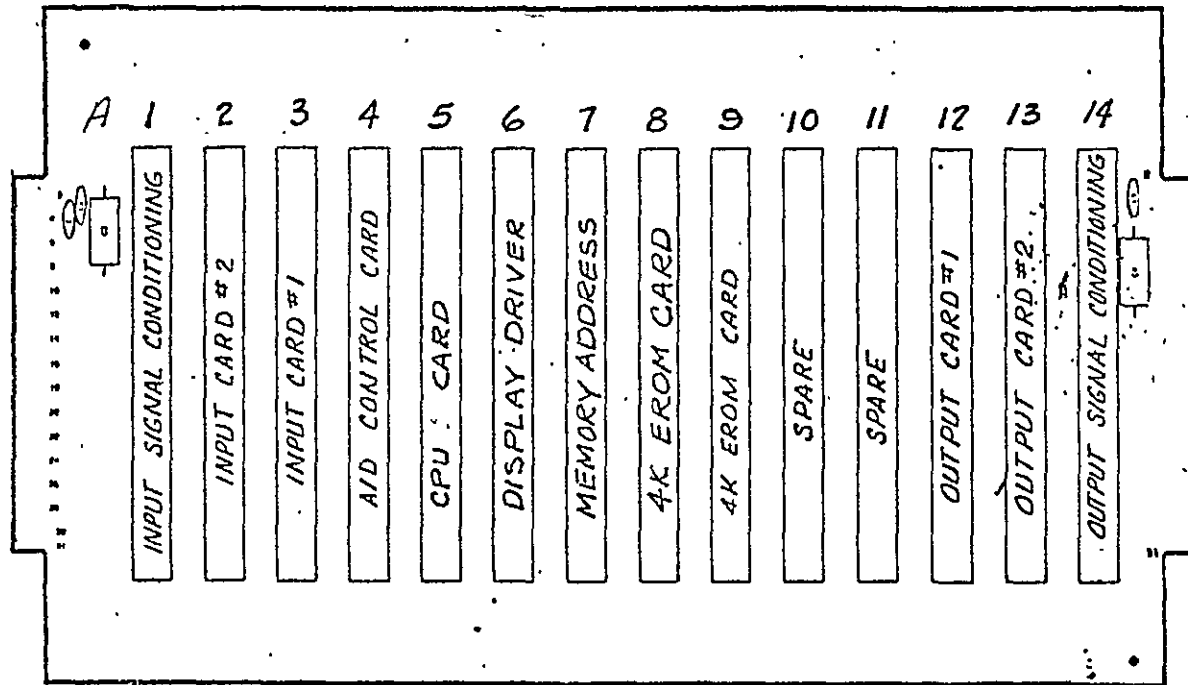
A-52 Figure 7.2



A-53

Figure 7.3

REVISIONS				
ZONE	REV	DESCRIPTION	BY	DATE
	1	RELEASED TO MFG PER EN		



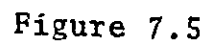
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Figure 7.4

PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048468	AW AND SPEC. DWG.	1
97170101	LIST OF MAT'L	1

ITEM NO		QTY	PART NUMBER	DESCRIPTION	
UNLESS OTHERWISE SPECIFIED:				DATE	DATE
DIMENSIONS ARE IN INCHES TOLERANCES ON				DATE	DATE
DECIMALS				DATE	DATE
AS SHOWN				DATE	DATE
UNLESS SHOWN OTHERWISE				DATE	DATE
SEE LIST OF MAT'L				DATE	DATE
FINISH				DATE	DATE
PROGRAM POINT				DATE	DATE
ASSEMBLY - MOTHER BOARD				DATE	DATE
C				DATE	DATE

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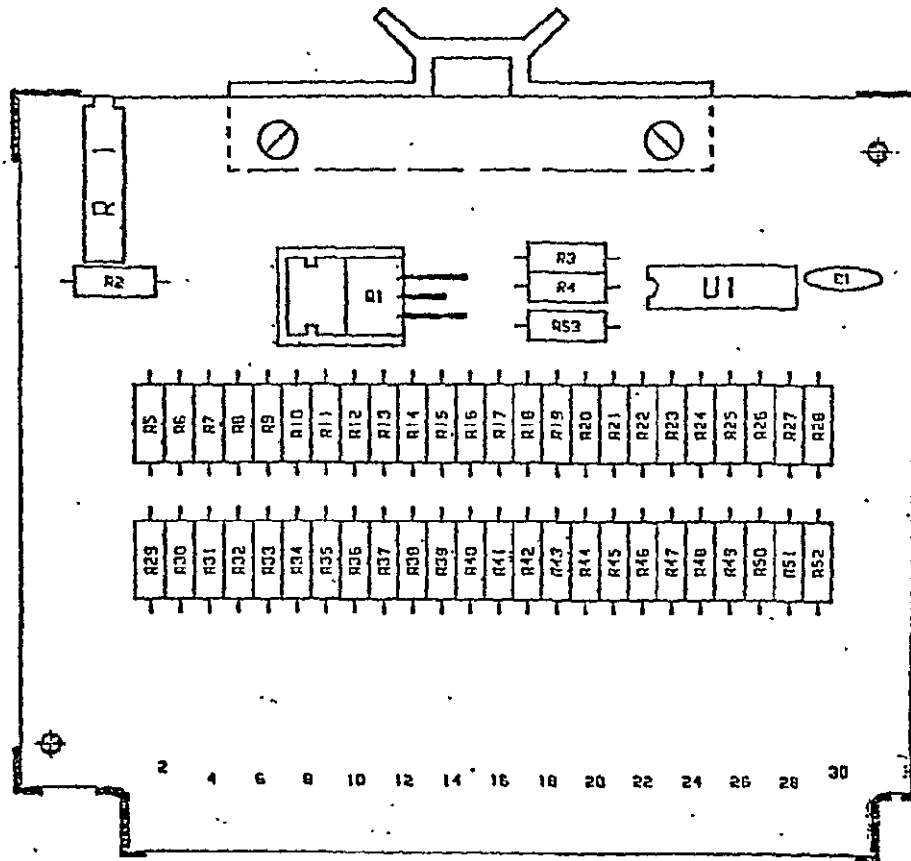


NOTES:
 $\left. \begin{array}{l} R30, R31, R32, \\ R37, R38, R39 \end{array} \right\} 3.570K \pm 1\%$

	VIEW NO.	DWG	PART NUMBER	DESCRIPTION					
	UNLESS OTHERWISE SPECIFIED:			DRWING	DATE				
	DIMENSIONS ARE IN INCHES TOLERANCES BY DECIMALS ± .005 ± .010 ± .015 ± .020 ± .030 ± .040 ± .050 ± .075 ± .100 ± .125 ± .150 ± .1875 ± .250 ± .3125 ± .375 ± .500 ± .625 ± .750 ± .875 ± 1.000 ± 1.250 ± 1.500 ± 1.875 ± 2.000 ± 2.500 ± 3.000 ± 3.750 ± 4.000 ± 5.000 ± 6.000 ± 7.500 ± 8.000 ± 9.000 ± 10.000 ± 12.000 ± 15.000 ± 18.000 ± 20.000 ± 25.000 ± 30.000 ± 35.000 ± 40.000 ± 45.000 ± 50.000 ± 55.000 ± 60.000 ± 65.000 ± 70.000 ± 75.000 ± 80.000 ± 85.000 ± 90.000 ± 95.000 ± 100.000 ± 125.000 ± 150.000 ± 175.000 ± 200.000 ± 250.000 ± 300.000 ± 350.000 ± 400.000 ± 450.000 ± 500.000 ± 550.000 ± 600.000 ± 650.000 ± 700.000 ± 750.000 ± 800.000 ± 850.000 ± 900.000 ± 950.000 ± 1000.000 ± 1250.000 ± 1500.000 ± 1750.000 ± 2000.000 ± 2500.000 ± 3000.000 ± 3500.000 ± 4000.000 ± 4500.000 ± 5000.000 ± 5500.000 ± 6000.000 ± 6500.000 ± 7000.000 ± 7500.000 ± 8000.000 ± 8500.000 ± 9000.000 ± 9500.000 ± 10000.000 ± 12500.000 ± 15000.000 ± 17500.000 ± 20000.000 ± 25000.000 ± 30000.000 ± 35000.000 ± 40000.000 ± 45000.000 ± 50000.000 ± 55000.000 ± 60000.000 ± 65000.000 ± 70000.000 ± 75000.000 ± 80000.000 ± 85000.000 ± 90000.000 ± 95000.000 ± 100000.000 ± 125000.000 ± 150000.000 ± 175000.000 ± 200000.000 ± 250000.000 ± 300000.000 ± 350000.000 ± 400000.000 ± 450000.000 ± 500000.000 ± 550000.000 ± 600000.000 ± 650000.000 ± 700000.000 ± 750000.000 ± 800000.000 ± 850000.000 ± 900000.000 ± 950000.000 ± 1000000.000 ± 1250000.000 ± 1500000.000 ± 1750000.000 ± 2000000.000 ± 2500000.000 ± 3000000.000 ± 3500000.000 ± 4000000.000 ± 4500000.000 ± 5000000.000 ± 5500000.000 ± 6000000.000 ± 6500000.000 ± 7000000.000 ± 7500000.000 ± 8000000.000 ± 8500000.000 ± 9000000.000 ± 9500000.000 ± 10000000.000 ± 12500000.000 ± 15000000.000 ± 17500000.000 ± 20000000.000 ± 25000000.000 ± 30000000.000 ± 35000000.000 ± 40000000.000 ± 45000000.000 ± 50000000.000 ± 55000000.000 ± 60000000.000 ± 65000000.000 ± 70000000.000 ± 75000000.000 ± 80000000.000 ± 85000000.000 ± 90000000.000 ± 95000000.000 ± 100000000.000 ± 125000000.000 ± 150000000.000 ± 175000000.000 ± 200000000.000 ± 250000000.000 ± 300000000.000 ± 350000000.000 ± 400000000.000 ± 450000000.000 ± 500000000.000 ± 550000000.000 ± 600000000.000 ± 650000000.000 ± 700000000.000 ± 750000000.000 ± 800000000.000 ± 850000000.000 ± 900000000.000 ± 950000000.000 ± 1000000000.000 ± 1250000000.000 ± 1500000000.000 ± 1750000000.000 ± 2000000000.000 ± 2500000000.000 ± 3000000000.000 ± 3500000000.000 ± 4000000000.000 ± 4500000000.000 ± 5000000000.000 ± 5500000000.000 ± 6000000000.000 ± 6500000000.000 ± 7000000000.000 ± 7500000000.000 ± 8000000000.000 ± 8500000000.000 ± 9000000000.000 ± 9500000000.000 ± 10000000000.000 ± 12500000000.000 ± 15000000000.000 ± 17500000000.000 ± 20000000000.000 ± 25000000000.000 ± 30000000000.000 ± 35000000000.000 ± 40000000000.000 ± 45000000000.000 ± 50000000000.000 ± 55000000000.000 ± 60000000000.000 ± 65000000000.000 ± 70000000000.000 ± 75000000000.000 ± 80000000000.000 ± 85000000000.000 ± 90000000000.000 ± 95000000000.000 ± 100000000000.000 ± 125000000000.000 ± 150000000000.000 ± 175000000000.000 ± 200000000000.000 ± 250000000000.000 ± 300000000000.000 ± 350000000000.000 ± 400000000000.000 ± 450000000000.000 ± 500000000000.000 ± 550000000000.000 ± 600000000000.000 ± 650000000000.000 ± 700000000000.000 ± 750000000000.000 ± 800000000000.000 ± 850000000000.000 ± 900000000000.000 ± 950000000000.000 ± 1000000000000.000 ± 1250000000000.000 ± 1500000000000.000 ± 1750000000000.000 ± 2000000000000.000 ± 2500000000000.000 ± 3000000000000.000 ± 3500000000000.000 ± 4000000000000.000 ± 4500000000000.000 ± 5000000000000.000 ± 5500000000000.000 ± 6000000000000.000 ± 6500000000000.000 ± 7000000000000.000 ± 7500000000000.000 ± 8000000000000.000 ± 8500000000000.000 ± 9000000000000.000 ± 9500000000000.000 ± 10000000000000.000 ± 12500000000000.000 ± 15000000000000.000 ± 17500000000000.000 ± 20000000000000.000 ± 25000000000000.000 ± 30000000000000.000 ± 35000000000000.000 ± 40000000000000.000 ± 45000000000000.000 ± 50000000000000.000 ± 55000000000000.000 ± 60000000000000.000 ± 65000000000000.000 ± 70000000000000.000 ± 75000000000000.000 ± 80000000000000.000 ± 85000000000000.000 ± 90000000000000.000 ± 95000000000000.000 ± 100000000000000.000 ± 125000000000000.000 ± 150000000000000.000 ± 175000000000000.000 ± 200000000000000.000 ± 250000000000000.000 ± 300000								

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			

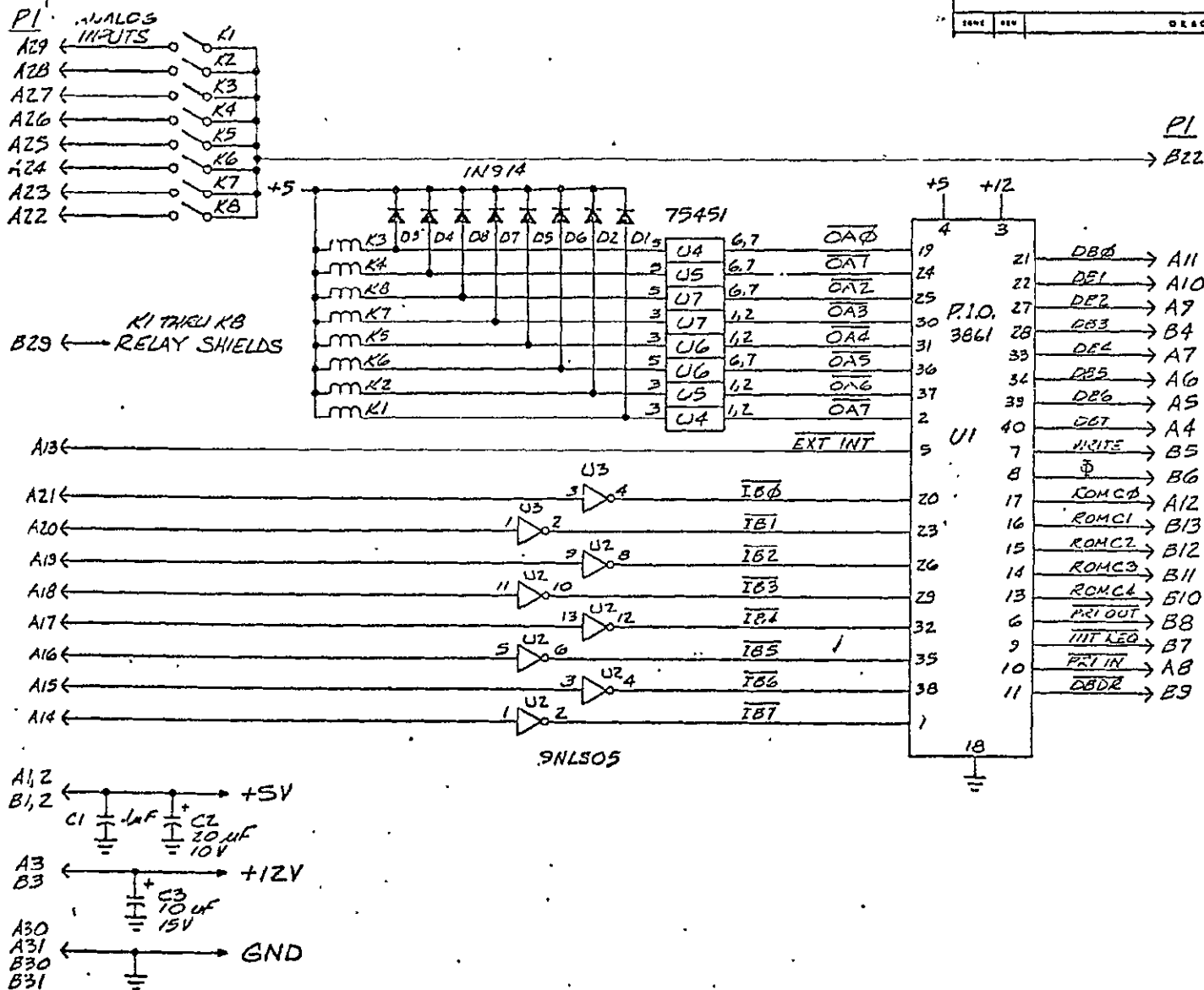


PRINCIPLE DRAWING TABLE

DRAWING NO.	DOCUMENTATION
40048473	A/W AND SPEC
97470110-04	SCHEMATIC
97470110	LIST OF MAT'L

UNLESS OTHERWISE SPECIFIED	DRAWN	DATE
DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS XX ± .03 XXX ± .010	CHK	DATE
ANGLES 22° BREAK SHARP EDGES .010 MAX.	ENGR	DATE
TRIAL SEE LIST OF MAT'L	MFG	DATE
NEXT ASSY 82	PROJ. ENGR	DATE
	APPVCL	A-56

FAIRCHILD INSTRUMENTATION	TITLE ASSEMBLY - UNIVERSAL CARD
SIZE A	CODE IDENT NO. DWC NO. 97470110



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OF POOR QUALITY

Figure 7.6

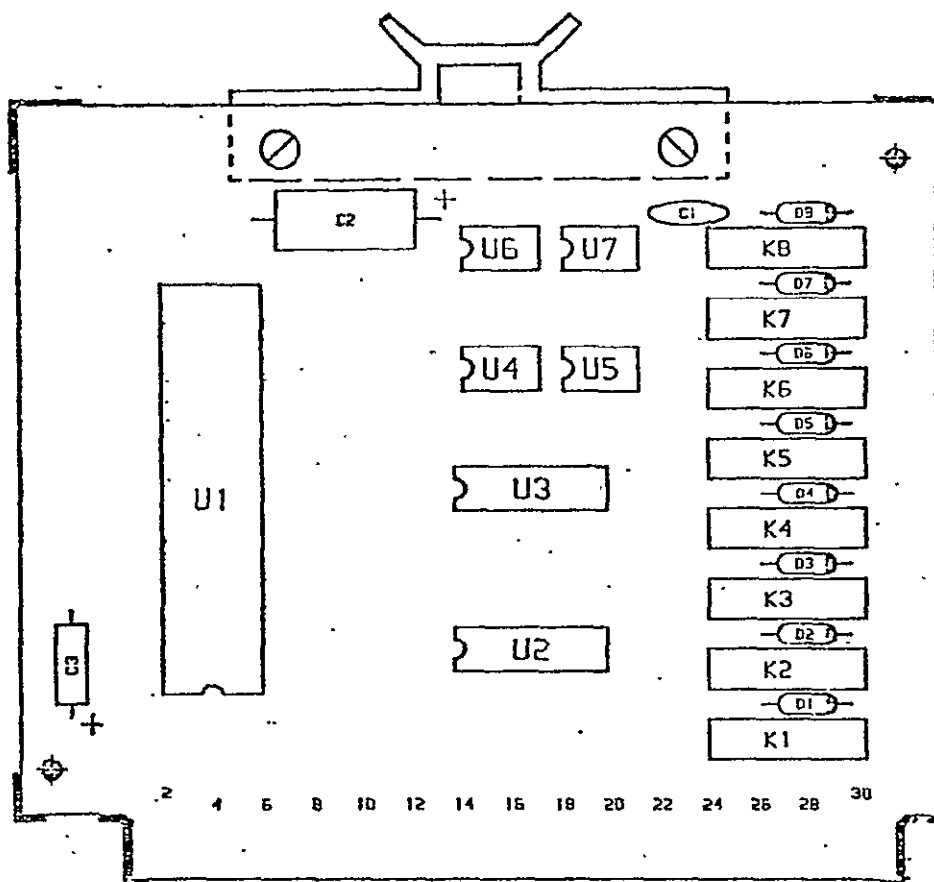
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100	100	100	100

SCHEMATIC -
RHO SIGMA;
INPUT CARD

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REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			

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OF POOR QUALITY

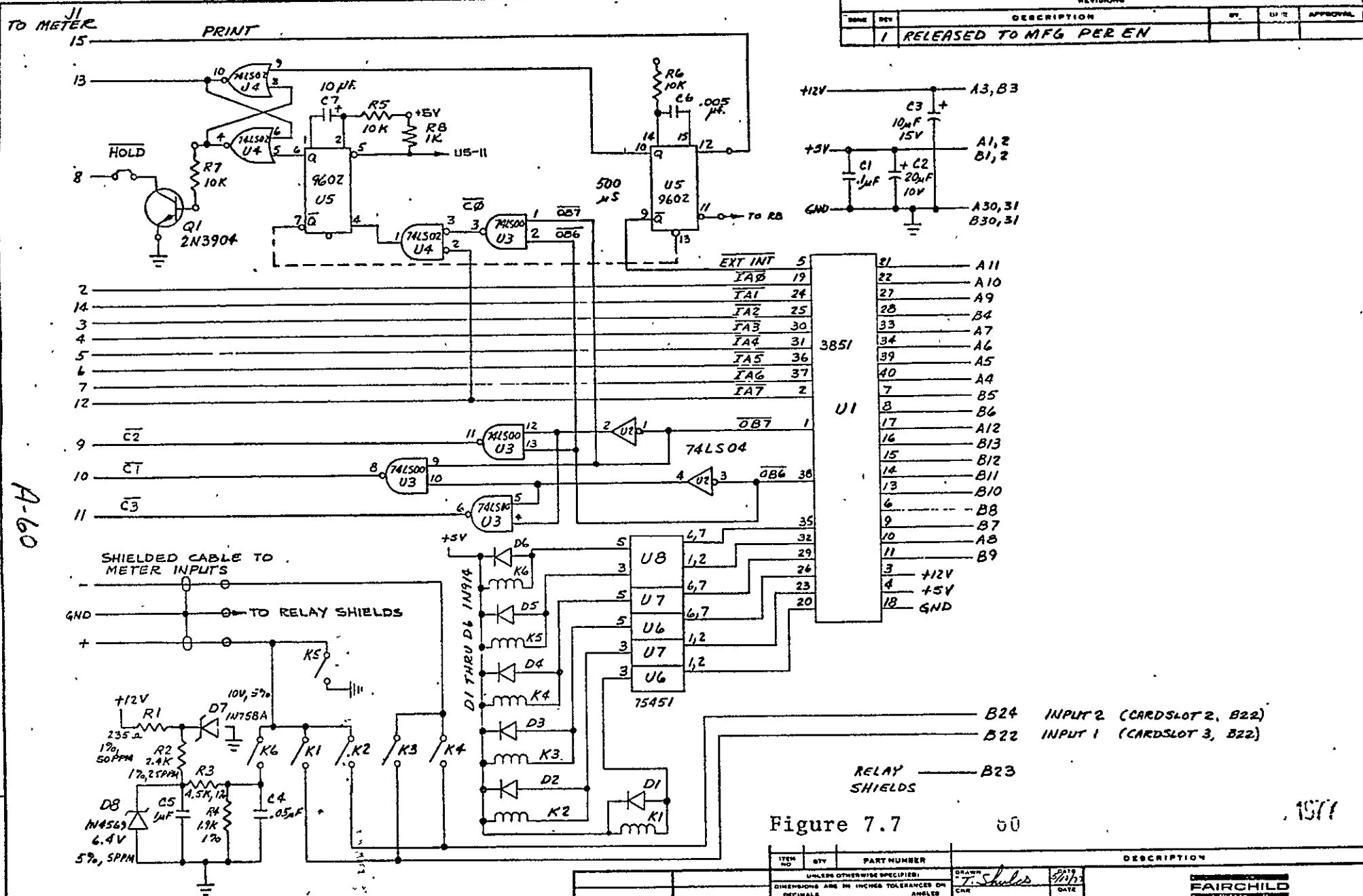


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PRINCIPLE DRAWING TABLE

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97470103-04	SCHEMATIC	R
97470103	LIST OF MAT'L	

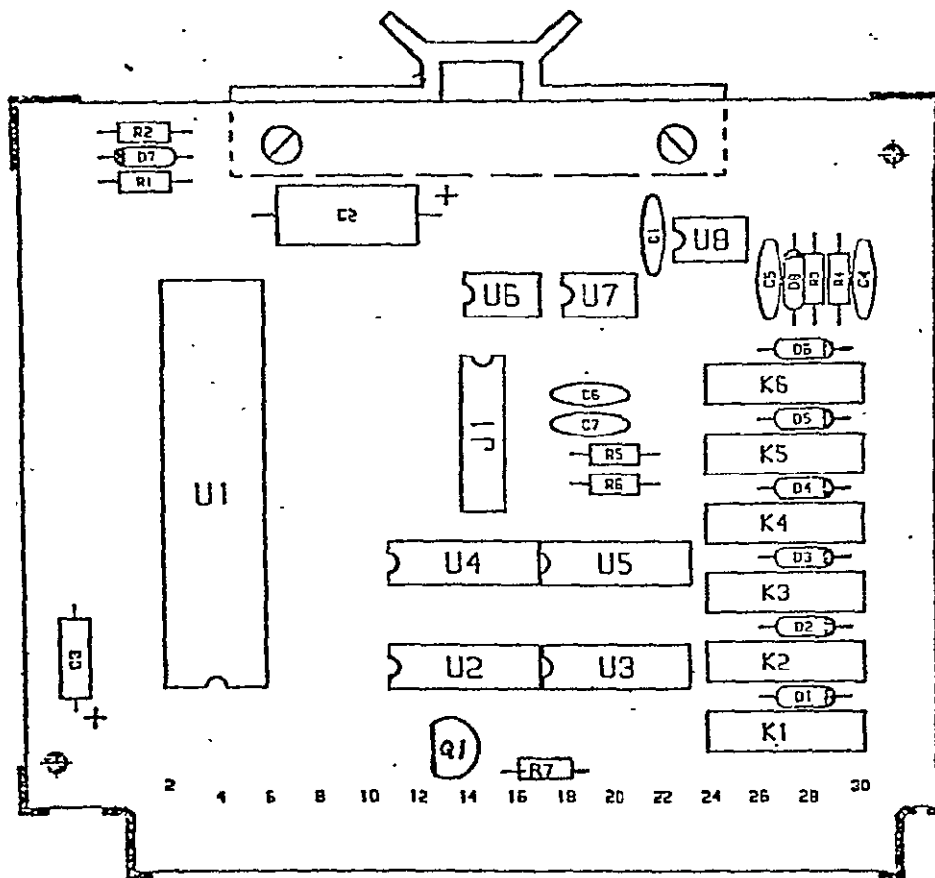
UNLESS OTHERWISE SPECIFIED		DATE	FAIRCHILD	
DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS		DATE	INSTRUMENTATION	
X .01		DATE	TITLE	
XX .03		DATE	ASSEMBLY -	
XXX .10		DATE	INPUT CARD	
BREAK SHARP EDGES .10 MAX.		DATE		
MATERIAL		DATE		
SEE LIST OF MAT'L		DATE		
NEXT ASSY		DATE		
82		DATE		
USED ON		DATE		
CONTR NO.		DATE		
A-59		DATE		
SIZE		DATE		
A		DATE		
CODE IDENT NO.		DATE		
97470103		DATE		
DWC NO.		DATE		
97470103		DATE		
REV		DATE		
		DATE		



NOTE: J1 GOES TO METER (DPM READ CARD) J3.
METER INPUTS BY SEPARATE SHIELDED CABLE

ITEM NO		QTY	PART NUMBER	DESCRIPTION	
UNLESS OTHERWISE SPECIFIED: <td colspan="2">DRAWN <i>T. Shules</i> DATE <i>7/1/71</i></td>				DRAWN <i>T. Shules</i> DATE <i>7/1/71</i>	
DIMENSIONS ARE IN INCHES TOLERANCES ON: <td colspan="2">CHK DATE</td>				CHK DATE	
DECIMALS .12 .15 .18 .21 .24 .27 .30 .33 .36 .39 .42 .45 .48 .51 .54 .57 .60 .63 .66 .69 .72 .75 .78 .81 .84 .87 .90 .93 .96 .99 .102 .105 .108 .111 .114 .117 .120 .123 .126 .129 .132 .135 .138 .141 .144 .147 .150 .153 .156 .159 .162 .165 .168 .171 .174 .177 .180 .183 .186 .189 .192 .195 .198 .201 .204 .207 .210 .213 .216 .219 .222 .225 .228 .231 .234 .237 .240 .243 .246 .249 .252 .255 .258 .261 .264 .267 .270 .273 .276 .279 .282 .285 .288 .291 .294 .297 .300 .303 .306 .309 .312 .315 .318 .321 .324 .327 .330 .333 .336 .339 .342 .345 .348 .351 .354 .357 .360 .363 .366 .369 .372 .375 .378 .381 .384 .387 .390 .393 .396 .399 .402 .405 .408 .411 .414 .417 .420 .423 .426 .429 .432 .435 .438 .441 .444 .447 .450 .453 .456 .459 .462 .465 .468 .471 .474 .477 .480 .483 .486 .489 .492 .495 .498 .501 .504 .507 .510 .513 .516 .519 .522 .525 .528 .531 .534 .537 .540 .543 .546 .549 .552 .555 .558 .561 .564 .567 .570 .573 .576 .579 .582 .585 .588 .591 .594 .597 .600 .603 .606 .609 .612 .615 .618 .621 .624 .627 .630 .633 .636 .639 .642 .645 .648 .651 .654 .657 .660 .663 .666 .669 .672 .675 .678 .681 .684 .687 .690 .693 .696 .699 .702 .705 .708 .711 .714 .717 .720 .723 .726 .729 .732 .735 .738 .741 .744 .747 .750 .753 .756 .759 .762 .765 .768 .771 .774 .777 .780 .783 .786 .789 .792 .795 .798 .801 .804 .807 .810 .813 .816 .819 .822 .825 .828 .831 .834 .837 .840 .843 .846 .849 .852 .855 .858 .861 .864 .867 .870 .873 .876 .879 .882 .885 .888 .891 .894 .897 .899 .902 .905 .908 .911 .914 .917 .920 .923 .926 .929 .932 .935 .938 .941 .944 .947 .950 .953 .956 .959 .962 .965 .968 .971 .974 .977 .980 .983 .986 .989 .992 .995 .998 .1001 .1004 .1007 .1010 .1013 .1016 .1019 .1022 .1025 .1028 .1031 .1034 .1037 .1040 .1043 .1046 .1049 .1052 .1055 .1058 .1061 .1064 .1067 .1070 .1073 .1076 .1079 .1082 .1085 .1088 .1091 .1094 .1097 .1100 .1103 .1106 .1109 .1112 .1115 .1118 .1121 .1124 .1127 .1130 .1133 .1136 .1139 .1142 .1145 .1148 .1151 .1154 .1157 .1160 .1163 .1166 .1169 .1172 .1175 .1178 .1181 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.3674 .3677 .3680 .3683 .3686 .3689 .3692 .3695 .3698 .3701 .3704 .3707 .3710 .3713 .3716 .3719 .3722 .3725 .3728 .3731 .3734 .3737 .3740 .3743 .3746 .3749 .3752 .3755 .3758 .3761 .3764 .3767 .3770 .3773 .3776 .3779 .3782 .3785 .3788 .3791 .3794 .3797 .3800 .3803 .3806 .3809 .3812 .3815 .3818 .3821 .3824 .3827 .3830 .3833 .3836 .3839 .3842 .3845 .3848 .3851 .3854 .3857 .3860 .3863 .3866 .3869 .3872 .3875 .3878 .3881 .3884 .3887 .3890 .3893 .3896 .3899 .3902 .3905 .3908 .3911 .3914 .3917 .3920 .3923 .3926 .3929 .3932 .3935 .3938 .3941 .3944 .3947 .3950 .3953 .3956 .3959 .3962 .3965 .3968 .3971 .3974 .3977 .3980 .3983 .3986 .3989 .3992 .3995 .3998 .4001 .4004 .4007 .4010 .4013 .4016 .4019 .4022 .4025 .4028 .4031 .4034 .4037 .4040 .4043 .4046 .4049 .4052 .4055 .4058 .4061 .4064 .4067 .4070 .4073 .4076 .4079 .4082 .4085 .4088 .4091 .4094 .4097 .4100 .4103 .4106 .4109 .4112 .4115 .4118 .4121 .4124 .4127 .4130 .4133 .4136 .4139 .4142 .4145 .4148 .4151 .4154 .4157 .4160 .4163 .4166 .4169 .4172 .4175 .4178 .4181 .4184 .4187 .4190 .4193 .4196 .4199 .4202 .4205 .4208 .4211 .4214 .4217 .4220 .4223 .4226 .4229 .4232 .4235 .4238 .4241 .4244 .4247 .4250 .4253 .4256 .4259 .4262 .4265 .4268 .4271 .4274 .4277 .4280 .4283 .4286 .4289 .4292 .4295 .4298 .4301 .4304 .4307 .4310 .4313 .4316 .4319 .4322 .4325 .4328 .4331 .4334 .4337 .4340 .4343 .4346 .4349 .4352 .4355 .4358 .4361 .4364 .4367 .4370 .4373 .4376 .4379 .4382 .4385 .4388 .4391 .4394 .4397 .4400 .4403 .4406 .4409 .4412 .4415 .4418 .4421 .4424 .4427 .4430 .4433 .4436 .4439 .4442 .4445 .4448 .4451 .4454 .4457 .4460 .4463 .4466 .4469 .4472 .4475 .4478 .4481 .4484 .4487 .4490 .4493 .4496 .4499 .4502 .4505 .4508 .4511 .4514 .4517 .4520 .4523 .4526 .4529 .4532 .4535 .4538 .4541 .4544 .4547 .4550 .4553 .4556 .4559 .4562 .4565 .4568 .4571 .4574 .4577 .4580 .4583 .4586 .4589 .4592 .4595 .4598 .4601 .4604 .4607 .4610 .4613 .4616 .4619 .4622 .4625 .4628 .4631 .4634 .4637 .4640 .4643 .4646 .4649 .4652 .4655 .4658 .4661 .4664 .4667 .4670 .4673 .4676 .4679 .4682 .4685 .4688 .4691 .4694 .4697 .4700 .4703 .4706 .4709 .4712 .4715 .4718 .4721 .4724 .4727 .4730 .4733 .4736 .4739 .4742 .4745 .4748 .4751 .4754 .4757 .4760 .4763 .4766 .4769 .4772 .4775 .4778 .4781 .4784 .4787 .4790 .4793 .4796 .4799 .4802 .4805 .4808 .4811 .4814 .4817 .4820 .4823 .4826 .4829 .4832 .4835 .4838 .4841 .4844 .4847 .4850 .4853 .4856 .4859 .4862 .4865 .4868 .4871 .4874 .4877 .4880 .4883 .4886 .4889 .4892 .4895 .4898 .4901 .4904 .4907 .4910 .4913 .4916 .4919 .4922 .4925 .4928 .4931 .4934 .4937 .4940 .4943 .4946 .4949 .4952 .4955 .4958 .4961 .4964 .4967 .4970 .4973 .4976 .4979 .4982 .4985 .4988 .4991 .4994 .4997 .5000 .5003 .5006 .5009 .5012 .5015 .5018 .5021 .5024 .5027 .5030 .5033 .5036 .5039 .5042 .5045 .5048 .5051 .5054 .5057 .5060 .5063 .5066 .5069 .5072 .5075 .5078 .5081 .5084 .5087 .5090 .5093 .5096 .5099 .5102 .5105 .5108 .5111 .5114 .5117 .5120 .5123 .5126 .5129 .5132 .5135 .5138 .5141 .5144 .5147 .5150 .5153 .5156 .5159 .5162 .5165 .5168 .5171 .5174 .5177 .5180 .5183 .5186 .5189 .5192 .5195 .5198 .5201 .5204 .5207 .5210 .5213 .5216 .5219 .5222 .5225 .5228 .5231 .5234 .5237 .5240 .5243 .5246 .5249 .5252 .5255 .5258 .5261 .5264 .5267 .5270 .5273 .5276 .5279 .5282 .5285 .5288 .5291 .5294 .5297 .5300 .5303 .5306 .5309 .5312 .5315 .5318 .5321 .5324 .5327 .5330 .5333 .5336 .5339 .5342 .5345 .5348 .5351 .5354 .5357 .5360 .5363 .5366 .5369 .5372 .5375 .5378 .5381 .5384 .5387 .5390 .5393 .5396 .5399 .5402 .5405 .5408 .5411 .5414 .5417 .5420 .5423 .5426 .5429 .5432 .5435 .5438 .5441 .5444 .5447 .5450 .5453 .5456 .5459 .5462 .5465 .5468 .5471 .5474 .5477 .5480 .5483 .5486 .5489 .5492 .5495 .5498 .5501 .5504 .5507 .5510 .5513 .5516 .5519 .5522 .5525 .5528 .5531 .5534 .5537 .5540 .5543 .5546 .5549 .5552 .5555 .5558 .5561 .5564 .5567 .5570 .5573 .5576 .5579 .5582 .5585 .5588 .5591 .5594 .5597 .5600 .5603 .5606 .5609 .5612 .5615 .5618 .5621 .5624 .5627 .5630 .5633 .5636 .5639 .5642 .5645 .5648 .5651 .5654 .5657 .5660 .5663 .5666 .5669 .5672 .5675 .5678 .5681 .5684 .5687 .5690 .5693 .5696 .5699 .5702 .5705 .5708 .5711 .5714 .5717 .5720 .5723 .5726 .5729 .5732 .5735 .5738 .5741 .5744 .5747 .5750 .5753 .5756 .5759 .5762 .5765 .5768 .5771 .5774 .5777 .5780 .5783 .5786 .5789 .5792 .5795 .5798 .5801 .5804 .5807 .5810 .5813 .5816 .5819 .5822 .5825 .5828 .5831 .5834 .5837 .5840 .5843 .5846 .5849 .5852 .5855 .5858 .5861 .5864 .5867 .5870 .5873 .5876 .5879 .5882 .5885 .5888 .5891 .5894 .5897 .5900 .5903 .5906 .5909 .5912 .5915 .5918 .5921 .5924 .5927 .5930 .5933 .5936 .5939 .5942 .5945 .5948 .5951 .5954 .5957 .5960 .5963 .5966 .5969 .5972 .5975 .5978 .5981 .5984 .5987 .5990 .5993 .5996 .5999 .6002 .6005 .6008 .6011 .6014 .6017 .6020 .6023 .6026 .6029 .6032 .6035 .6038 .6041 .6044 .6047 .6050 .6053 .6056 .6059 .6062 .6065 .6068 .6071 .6074 .6077 .6080 .6083 .6086 .6089 .6092 .6095 .6098 .6101 .6104 .6107 .6110 .6113 .6116 .6119 .6122 .6125 .6128 .6131 .6134 .6137 .6140 .6143 .6146 .6149 .6152 .6155 .6158 .6161 .6164 .6167 .6170 .6173 .6176 .6179 .6182 .6185 .6188 .6191 .6194 .6197 .6200 .6203 .6206 .6209 .6212 .6215 .6218 .6221 .6224 .6227 .6230 .6233 .6236 .6239 .6242 .6245 .6248 .6251 .6254 .6257 .6260 .6263 .6266 .6269 .6272 .6275 .6278 .6281 .6284 .6287 .6290 .6293 .6296 .6299 .6302 .6305 .6308 .6311 .6314 .6317 .6320 .6323 .6326 .6329 .6332 .6335 .6338 .6341 .6344 .6347 .6350 .6353 .6356 .6359 .6362 .6365 .6368 .6371 .6374 .6377 .6380 .6383 .6386 .6389 .6392 .6395 .6398 .6401 .6404 .6407 .6410 .6413 .6416 .6419 .6422 .6425 .6428 .6431 .6434 .6437 .6440 .6443 .6446 .6449 .6452 .6455 .6458 .6461 .6464 .6467 .6470 .6473 .6476 .6479 .6482 .6485 .6488 .6491 .6494 .6497 .6500 .6503 .6506 .6509 .6512 .6515 .6518 .6521 .6524 .6527 .6530 .6533 .6536 .6539 .6542 .6545 .6548 .6551 .6554 .6557 .6560 .6563 .6566 .6569 .6572 .6575 .6578 .6581 .6584 .6587 .6590 .6593 .6596 .6599 .6602 .6605 .6608 .6611 .6614 .6617 .6620 .6623 .6626 .6629 .6632 .6635 .6638 .6641 .6644 .6647 .6650 .6653 .6656 .6659 .6662 .6665 .6668 .6671 .6674 .6677 .6680 .6683 .6686 .6689 .6692 .6695 .6698 .6701 .6704 .6707 .6710 .6713 .6716 .6719 .6722 .6725 .6728 .6731 .6734 .6737 .6740 .6743 .6746 .6749 .6752 .6755 .6758 .6761 .6764 .6767 .6770 .6773 .6776 .6779 .6782 .6785 .6788 .6791 .6794 .6797 .6800 .6803 .6806 .6809 .6812 .6815 .6818 .6821 .6824 .6827 .6830 .6833 .6836 .6839 .6842 .6845 .6848 .6851 .6854 .6857 .6860 .6863 .6866 .6869 .6872 .6875 .6878 .6881 .6884 .6887 .6890 .6893 .6896 .6899 .6902 .6905 .6908 .6911 .6914 .6917 .6920 .6923 .6926 .6929 .6932 .6935 .6938 .6941 .6944 .6947 .6950 .6953 .6956 .6959 .6962 .6965 .6968 .6971 .6974 .6977 .6980 .6983 .6986 .6989 .6992 .6995 .6998 .7001 .7004 .7007 .7010 .7013 .7016 .7019 .7022 .7025 .7028 .7031 .7034 .7037 .7040 .7043 .7046 .7049 .7052 .7055 .7058 .7061 .7064 .7067 .7070 .7073 .7076 .7079 .7082 .7085 .7088 .7091 .7094 .7097 .7100 .7103 .7106 .7109 .7112 .7115 .7118 .7121 .7124 .7127 .7130 .7133 .7136 .7139 .7142 .7145 .7148 .7151 .7154 .7157 .7160 .7163 .7166 .7169 .7172 .7175 .7178 .7181 .7184 .7187 .7190 .7193 .7196 .7199 .7202 .7205 .7208 .7211 .7214 .7217 .7220 .7223 .7226 .7229 .7232 .7235 .7238 .7241 .7244 .7247 .7250 .7253 .7256 .7259 .7262 .7265 .7268 .7271 .7274 .7277 .7280 .7283 .7286 .7289 .7292 .7295 .7298 .7301 .7304 .7307 .7310 .7313 .7316 .7319 .7322 .7325 .7328 .7331 .7334 .7337 .7340 .7343 .7346 .7349 .7352 .7355 .7358 .7361 .7364 .7367 .7370 .7373 .7376 .7379 .7382 .7385 .7388 .7391 .7394 .7397 .7400 .7403 .7406 .7409 .7412 .7415 .7418 .7421 .7424 .7427 .7430 .7433 .7436 .7439 .7442 .7445 .7448 .7451 .7454 .7457 .7460 .7463 .7466 .7469 .7472 .7475 .7478 .7481 .7484 .7487 .7490 .7493 .7496 .7499 .7502 .7505 .7508 .7511 .7514 .7517 .7520 .7523 .7526 .7529 .7532 .7535 .7538 .7541 .7544 .7547 .7550 .7553 .7556 .7559 .7562 .7565 .7568 .7571 .7574 .757					

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



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PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV.
40048471	A/W AND SPEC	1
97470108-04	SCHEMATIC	2
97470108	LIST OF MAT'L	

UNLESS OTHERWISE SPECIFIED		DRAWN <i>[Signature]</i>	DATE <i>[Date]</i>	FAIRCHILD INSTRUMENTATION	
DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS		CHK	DATE	TITLE ASSEMBLY - A/D CONTROL CARD	
ANGLES		ENG	DATE		
XX ± .03		MFG	DATE		
XXX ± .010		PRD. ENGR	DATE		
SEE LIST OF MAT'L		APPRD. <i>A-61</i>	DATE	SIZE A	CODE IDENT NO
NEXT ASSY 82		CONTR NO. 011012477	DATE	DWG NO 97470108	REV.
USED ON		SCALE 1/1			

J3

A6

C3

REVISIONS				BY	DATE	APPROVAL
DATE	REV	DESCRIPTION				
	1	RELEASED TO MFG PER EN				

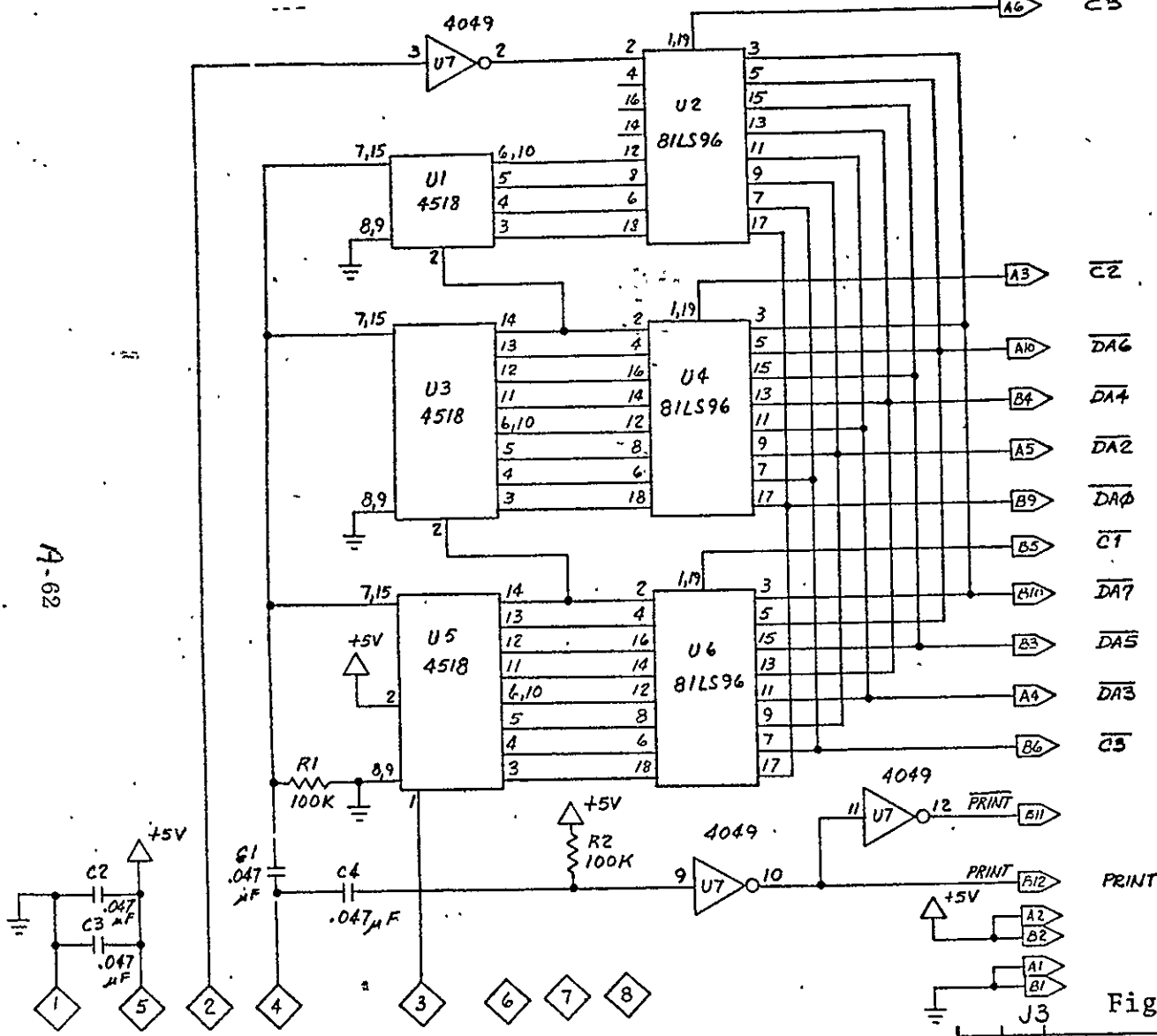


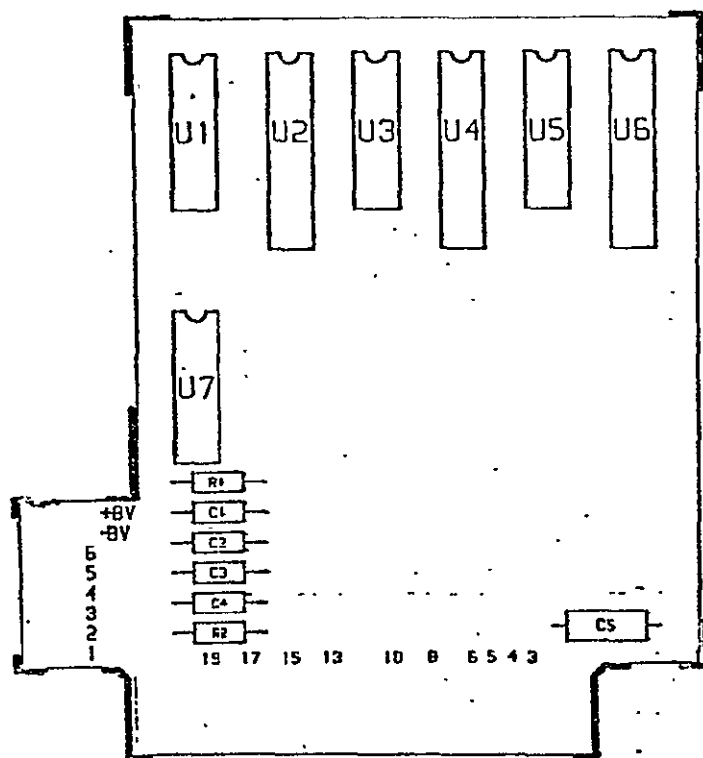
Figure 7.8

NOTE. J3 CONNECTS TO A/D CONTROL CARD "J1"

ITEM NO	QTY	PART NUMBER	DESCRIPTION
UNLESS OTHERWISE SPECIFIED:			DATE
DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS			DATE
FRACTIONS ARE IN INCHES TOLERANCES ON FRACTIONS			DATE
BREAK SHARP EDGES 90° MAX			DATE
MATERIAL			DATE
FINISH			DATE
TREATMENT			DATE
LIBRARY NO.			DATE
USED ON			DATE
APPLICATION			DATE

FAIRCHILD INSTRUMENTATION	
TITLE	
SCHEMATIC - DPM READ CARD	
SIZE	CODE IDENT NO
C	97470109-04
SCALE	NO. 1E
SHEET 1 OF 1	

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



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PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV.
40048486	A/W AND SPEC	1
97470109-04	SCHEMATIC	RE
97470109	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS 3 ± .1 XX ± .03 XXX ± .010 BREAK SHARP EDGES .010 MAX.	DRAWN <i>T. Santos</i>	DATE 5/12/77
	CHK	DATE
	ENGR	DATE
	MFG	DATE
	PROJ. ENGR	DATE
SEE LIST OF MAT'L	APPROV. A-63	
NEXT ASSY 82	CONTR. NO.	
USED ON		

FAIRCHILD INSTRUMENTATION		TITLE ASSEMBLY— DPM READ. BOARD	
SIZE A	CODE IDENT NO	DWG NO 97470109	REV. 1
SCALE			

REVISIONS					DATE	BY	APP	APPROVAL
1	RELEASE TO MFG PER EN							

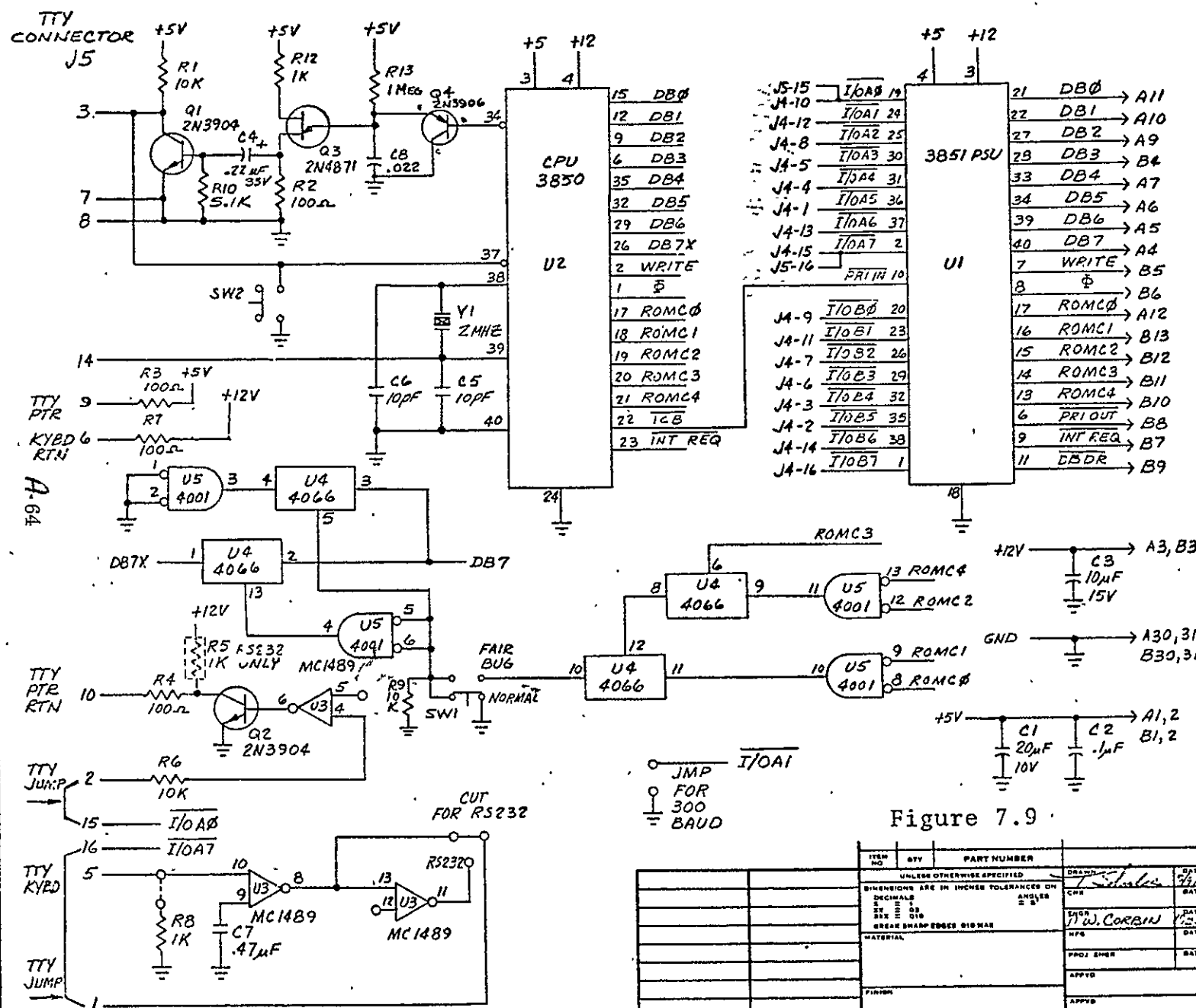


Figure 7.9

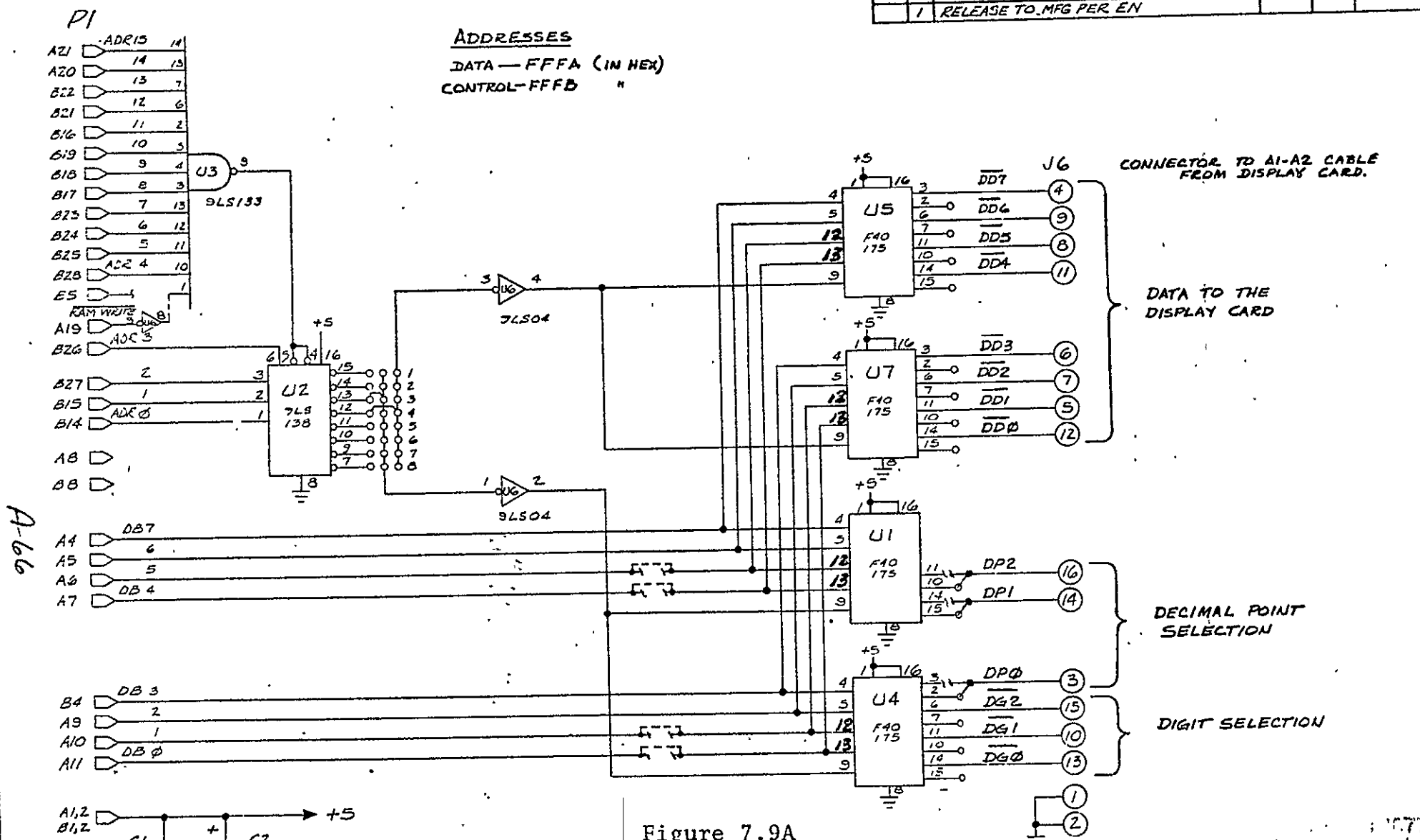
ITEM NO	REV	PART NUMBER	DESCRIPTION
		UNLESS OTHERWISE SPECIFIED	
		DIMENSIONS ARE IN INCHES TOLERANCES ON	
		DECIMALS	
		2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100	
		MATERIAL	
		FINISH	
		TREATMENT	
		CONTR NO	
		APPROV	
		DATE	
		SCALE	
		C	
		97470100-04	
		1	
		1 of 1	

PRINCIPLE DRAWING TABLE			
DRAWING NO.	DOCUMENTATION	RE	NO
40048472	A/W AND SPEC		1
97470100-04	SCHEMATIC		RE
97470100	LIST OF MAT'L		1

UNLESS OTHERWISE SPECIFIED		DRAWN <i>T. Santos</i>		DATE <i>5/12/77</i>		XXXXXXXXXX FAIRCHILD XXXXXXXXXX INSTRUMENTATION					
DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS ANGLES XX ± .01 32° XXX ± .010 BREAK SHARP EDGES .010 MAX.		CHK		DATE		TITLE <div style="text-align: center; font-size: 1.5em;"> ASSEMBLY - CPU BOARD </div>					
MATERIAL <div style="text-align: center; font-size: 1.2em;"> SEE LIST OF MAT'L </div>		ENGR		DATE							
		MFG		DATE							
		PROJ. ENGR		DATE							
NEXT ASSY <div style="text-align: center; font-size: 1.5em;">82</div>		APPVD. <div style="text-align: center; font-size: 1.5em;">A-65</div>		SIZE <div style="text-align: center; font-size: 1.5em;">A</div>		CODE IDENT NO. <div style="text-align: center; font-size: 1.5em;">97470100</div>		DWG NO. <div style="text-align: center; font-size: 1.5em;">97470100</div>		REV <div style="text-align: center; font-size: 1.5em;">1</div>	
USED ON <div style="text-align: center; font-size: 1.2em;"> PROGRAM CONTROLLER </div>		CONTR NO. <div style="text-align: center; font-size: 1.2em;"> DN-012477 </div>		SCALE <div style="text-align: center; font-size: 1.5em;">1/1</div>		SHEET 1 OF 1					

REVISIONS				BY	DATE	APPROVAL
DATE	REV	DESCRIPTION				
	1	RELEASE TO MFG PER EN				

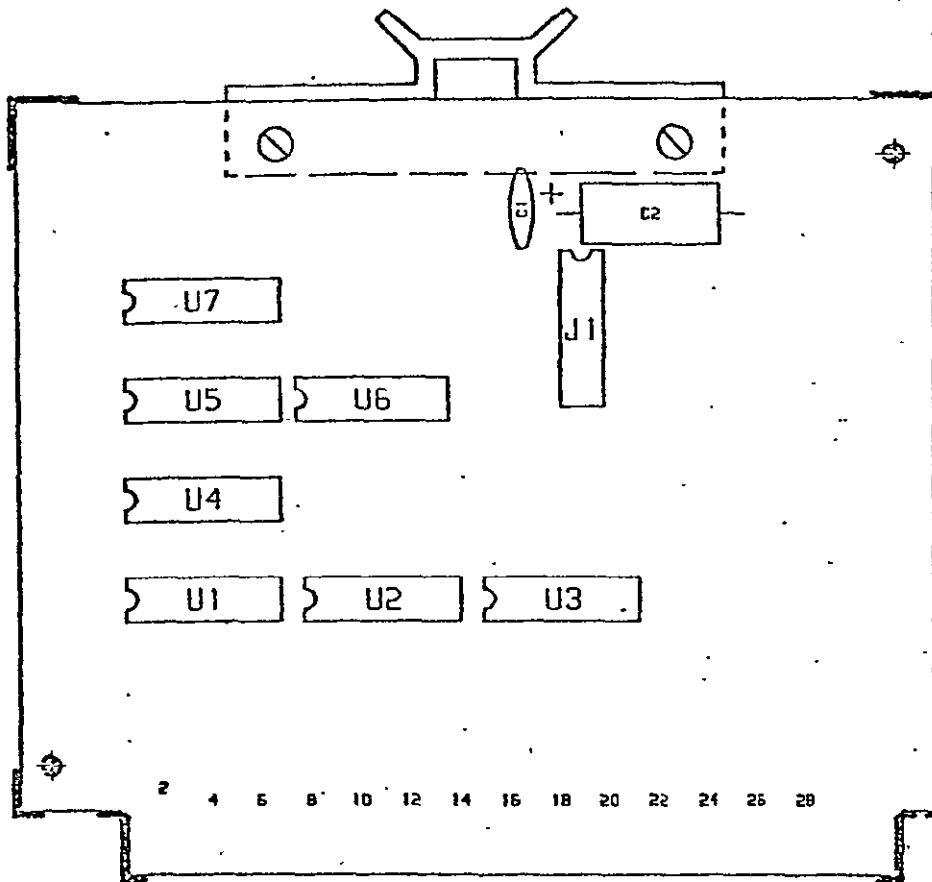
ADDRESSES
 DATA — FFFA (IN HEX)
 CONTROL — FFFB " "



ITEM NO.	QTY	PART NUMBER	DESCRIPTION
UNLESS OTHERWISE SPECIFIED:			
DIMENSIONS ARE IN INCHES TOLERANCES ON CHS			
DECIMALS 1/16 1/32 1/64 ANGLES 2° 3°			
BEND RADIUS MIN 1/16 1/32 1/64			
BREAK SHOWN AT 45°			
MATERIAL			
FINISH			
TREATMENT			
NEXT ASSY USED ON APPLICATION			
DRAWN BY JJA		DATE 1/77	
CHECKED BY W. CORBIN		DATE 7/77	
APPROVED BY		DATE	
APPROVED BY		DATE	
CONTR NO DN-012477		SCALE NONE	
C		97470105-04	
FAIRCHILD INSTRUMENTATION		SCHEMATIC - RHO SIGMA; DISPLAY DRIVER	
1 OF 1			

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



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PRINCIPLE DRAWING TABLE

DRAWING NO.	DOCUMENTATION	REV
40048467	A/W-AND SPEC	1
97470105-04	SCHEMATIC	RE
97470105	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED		DRAWN <i>T. Skidmore</i> CHK ENGR PFC PROJ. ENGR APPVD <i>A-67</i>	DATE <i>5/1/77</i> DATE DATE DATE DATE	FAIRCHILD INSTRUMENTATION TITLE ASSEMBLY - DISPLAY DRIVER CARD SIZE A	CODE IDENT NO. DYC NO 97470105	REV 1
DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS ANGLES X .1 .2° XX .03 .5° XXX .010 BREAK SHARP EDGES .010 MAX.						
SEE LIST OF MAT'L NEXT ASSY 82						

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REVISIONS				
REV	DATE	DESCRIPTION	BY	APPROVAL
1		RELEASED TO MFG PER EN		

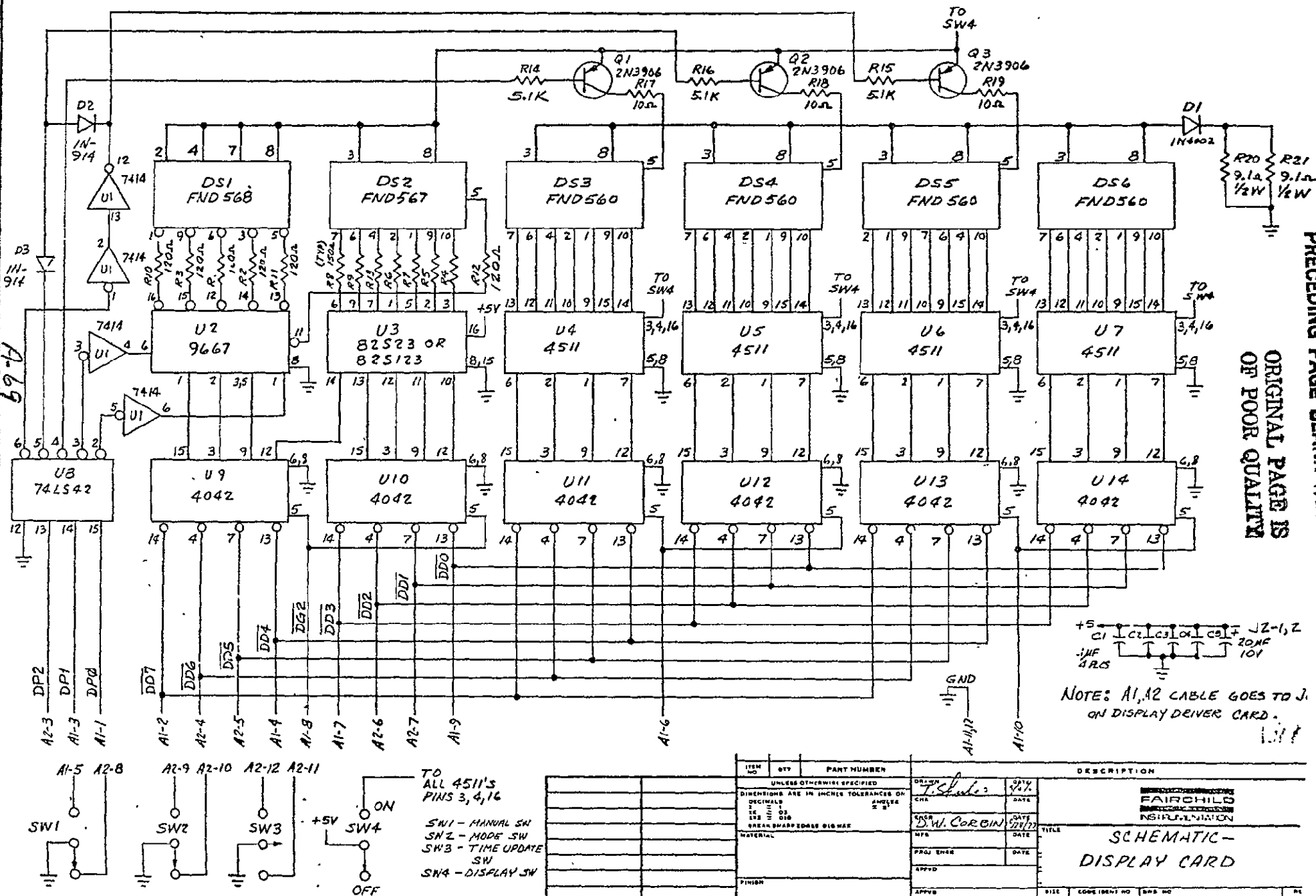


Figure 7.10

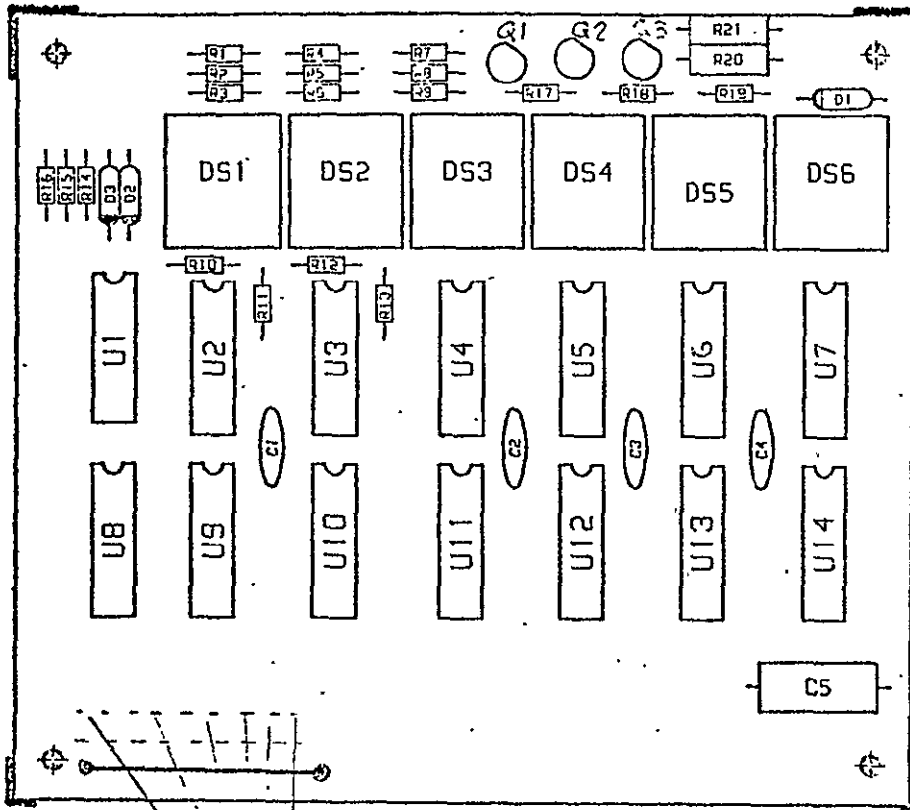
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ITEM NO	QTY	PART NUMBER	DESCRIPTION
UNLESS OTHERWISE SPECIFIED			
DIMENSIONS ARE IN INCHES TOLERANCES ON			
DECIMALS			
3 .010			
16 .005			
25 .010			
BREAK SHARP EDGES 0.015 MAX			
MATERIAL			
FINISH			
TREATMENT			
NEXT ASSY			
USED ON			
APPLICATION			
DRAWN BY <i>T. S. L...</i>			DATE
CHECKED BY <i>D. W. CORBIN</i>			DATE
PROJ ENGR			DATE
APPROV			DATE
FILE			CODE IDENT NO
C			97470111-04
SHEET 1 OF 1			

REVISIONS

Y.	DESCRIPTION	BY	DATE	APPROVED
	RELEASED TO MFG PER EN			

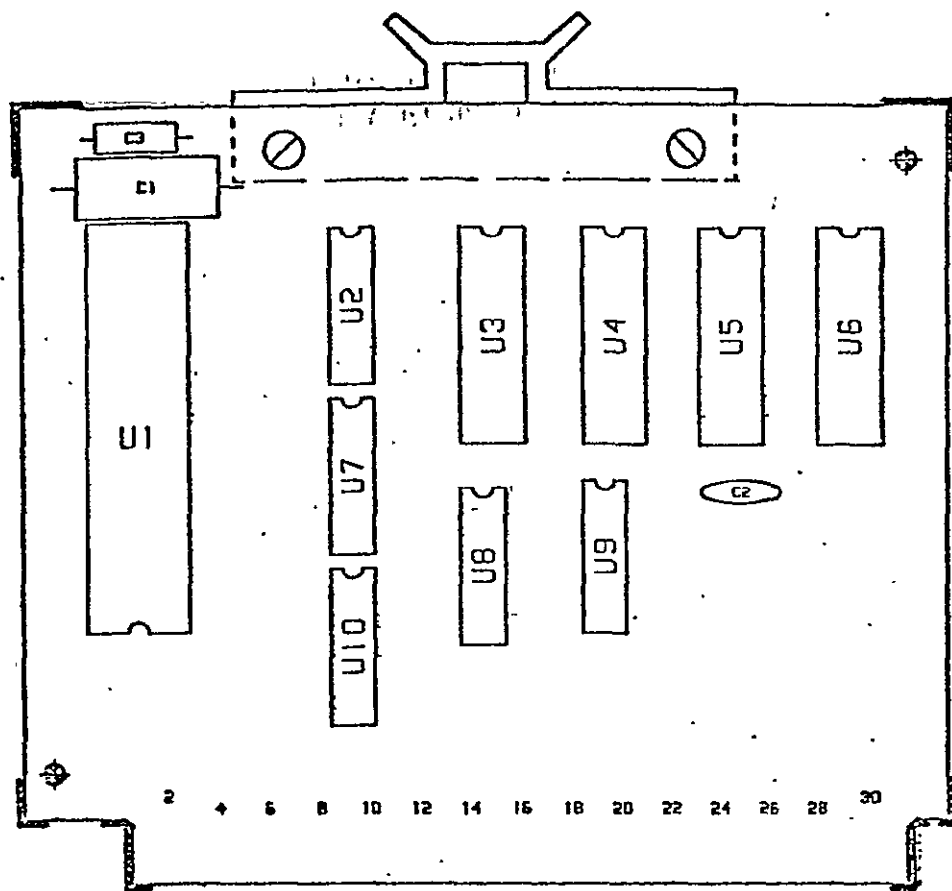


36 in

PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048491	A/W AND SPEC	1
97470111-04	SCHEMATIC	REF
97470111	LIST OF MAT'L	1

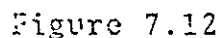
UNLESS OTHERWISE SPECIFIED		DRAWN <i>T. Shiller</i>		DATE		FAIRCHILD INSTRUMENTATION NOV - 4 1971	
DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS		CHK		DATE			
X .1		FACR		DATE			
XX .03		D. W. CORENS		DATE			
XXX .010		MFG		DATE		TITLE ASSEMBLY - DISPLAY CARD	
BREAK SHARP EDGES .010 MAX.		PROJ. ENGR		DATE		SIZE A	
MATERIAL SEE LIST OF MAT'L		APPROV. A-70		CODE IDENT NO		DWC NO 97470111	
EXT ASSY B2		CONTR NO. 01-012477		SCALE 1/1		REV 1	
SHEET 1 OF 1							

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			

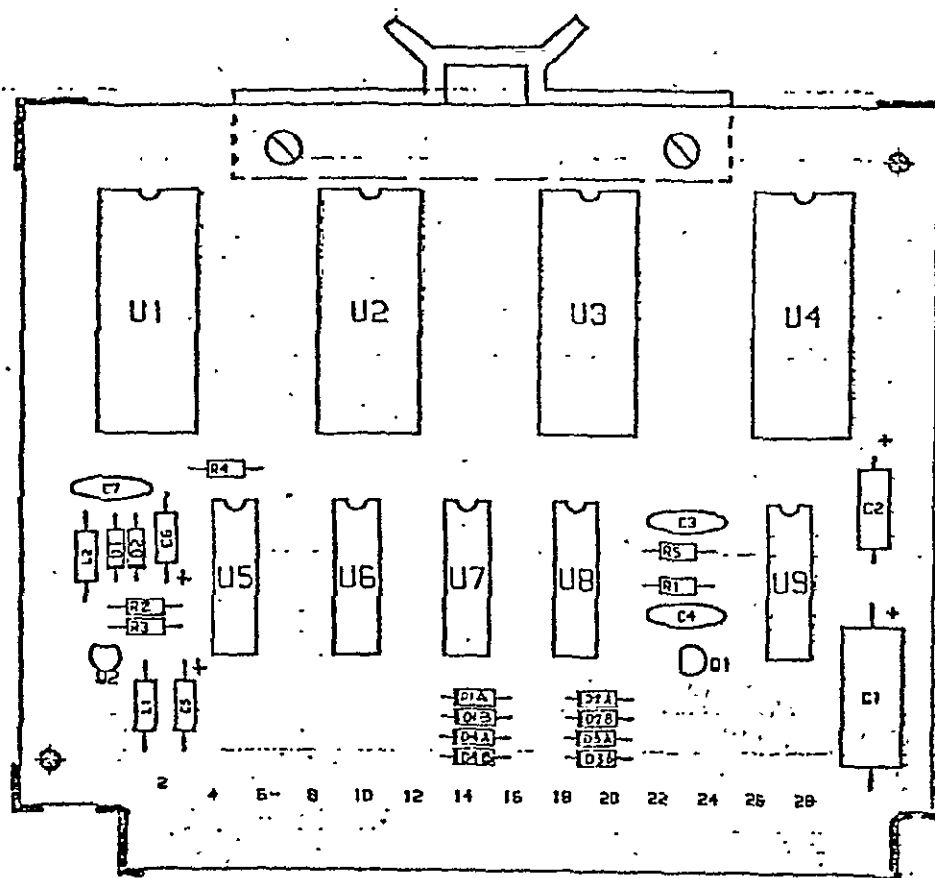


PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV.
40048470	A/W AND SPEC	1
97470107-04	SCHEMATIC	R
97470107-03	LIST OF MAT'L	

UNLESS OTHERWISE SPECIFIED		DRAWN <i>T. S. Shuler</i>		DATE 9/7/77		FAIRCHILD INSTRUMENTATION	
DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS X .01 XX .03 XXX .010		CHK		DATE		TITLE ASSEMBLY— MEMORY ADDRESS CAR	
ANGLES ± 2° BREAK SHARP EDGES .010 MAX.		ENGR		DATE			
MATERIAL SEE LIST OF MAT'L		MFG		DATE			
NEXT ASSY 82		PROJ. ENGR		DATE			
USED ON DPM RAM CONTROL FR		APPVD. A-72		SIZE A		CODE IDENT NO. 97470107	
CONTR NO. DN-012477				SCALE 1/1		REV. 1	



REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			

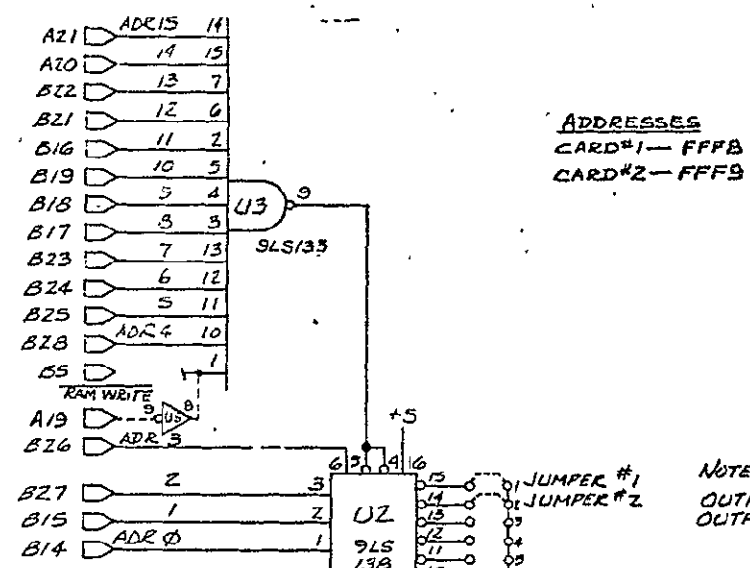


PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	RE NO
40048469	A/W AND SPEC	1
97470106-04	SCHEMATIC	RE
97470106	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED		DATE
DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS		DATE
ANGLES		DATE
±2°		DATE
BREAK SHARP EDGES DID MAX		DATE
SEE LIST OF MAT'L		DATE
NEXT ASSY		DATE
82		DATE
USED ON		DATE
DIP 177		DATE

FAIRCHILD INSTRUMENTATION	
TITLE	
ASSEMBLY - 4K EPROM CARD	
SIZE	CODE IDENT NO.
A	97470106
SCALE	1/1
SHEET	1 OF 1

REVISIONS				
DATE	REV	DESCRIPTION	BY	APPROVAL
	1	RELEASE TO MFG PER EN		



NOTE:
OUTPUT CARD #1 - JUMPER #1
OUTPUT CARD #2 - JUMPER #2

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OF POOR QUALITY

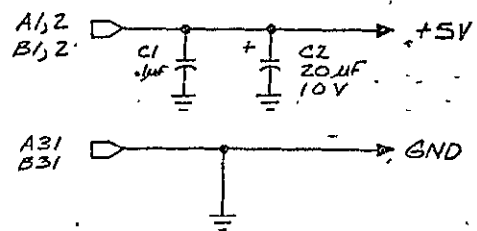
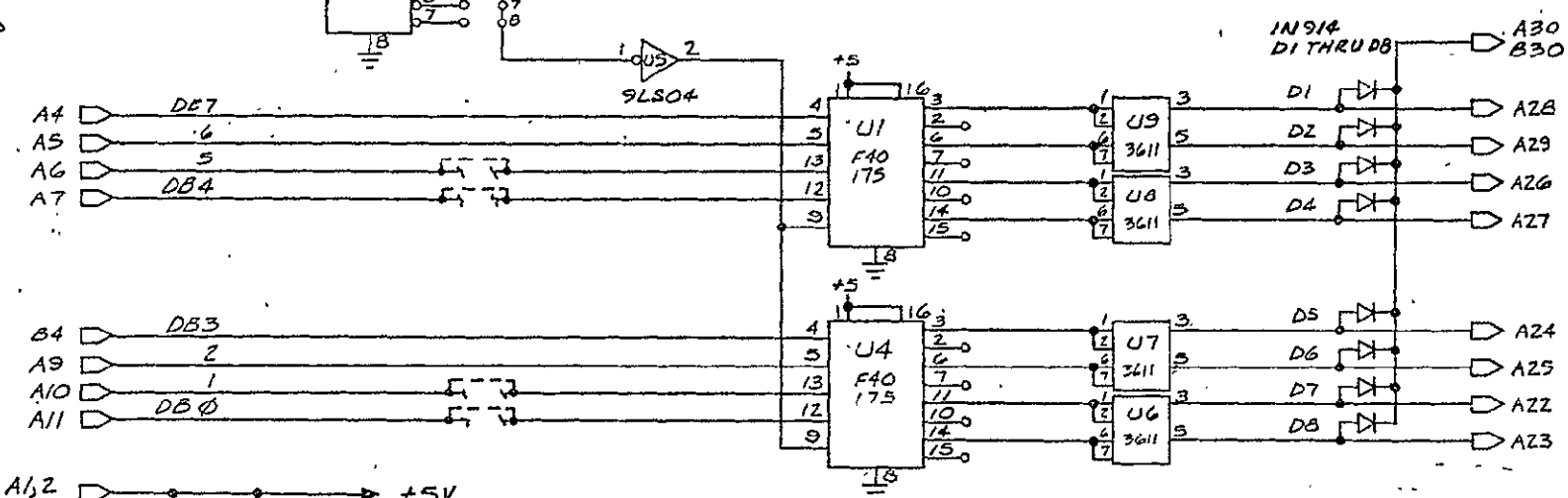
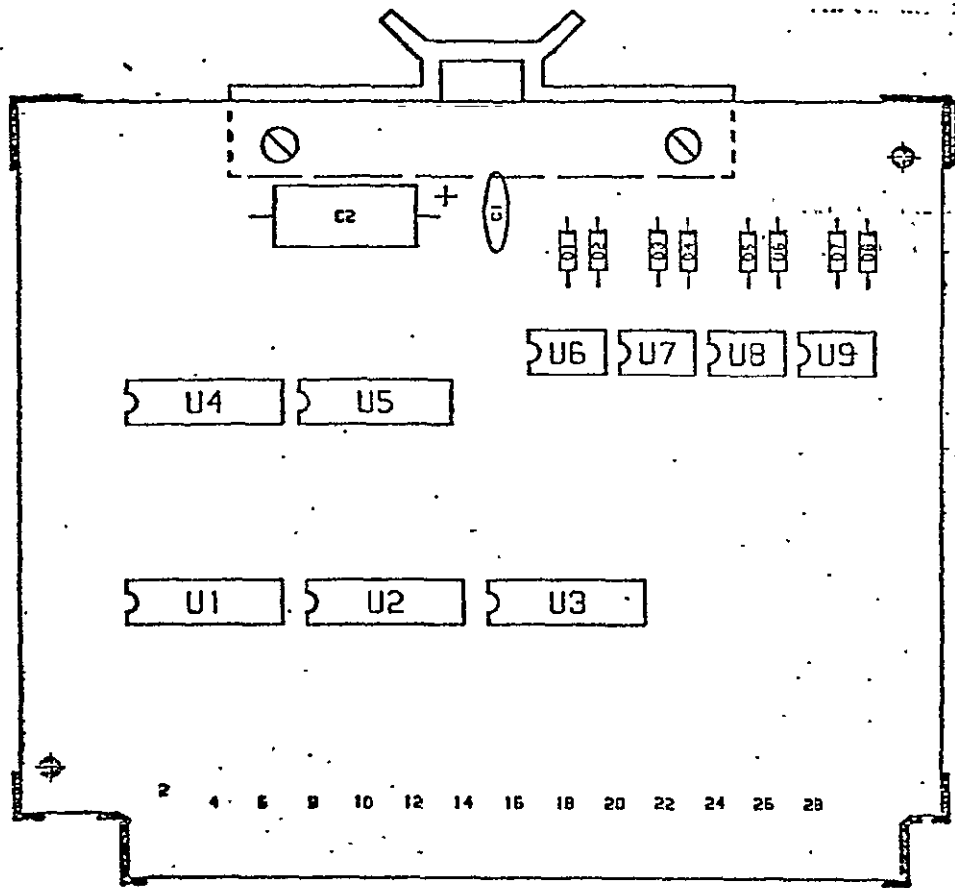


Figure 7.13

ITEM NO.	REV	PART NUMBER	DESCRIPTION
UNLESS OTHERWISE SPECIFIED:			
DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS			
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z			
DRAWN BY: J.W. COBBIN			
CHECKED BY: J.W. COBBIN			
APPROVED BY: J.W. COBBIN			
DATE: 10/1/77			
FAIRCHILD INSTRUMENTATION			
SCHEMATIC - RHO SIGMA; OUTPUT CARD			
ALL CODE INCHES NO. 97470104-04			
CONTRACT NO. DN-012477			
SHEET 1 OF 1			

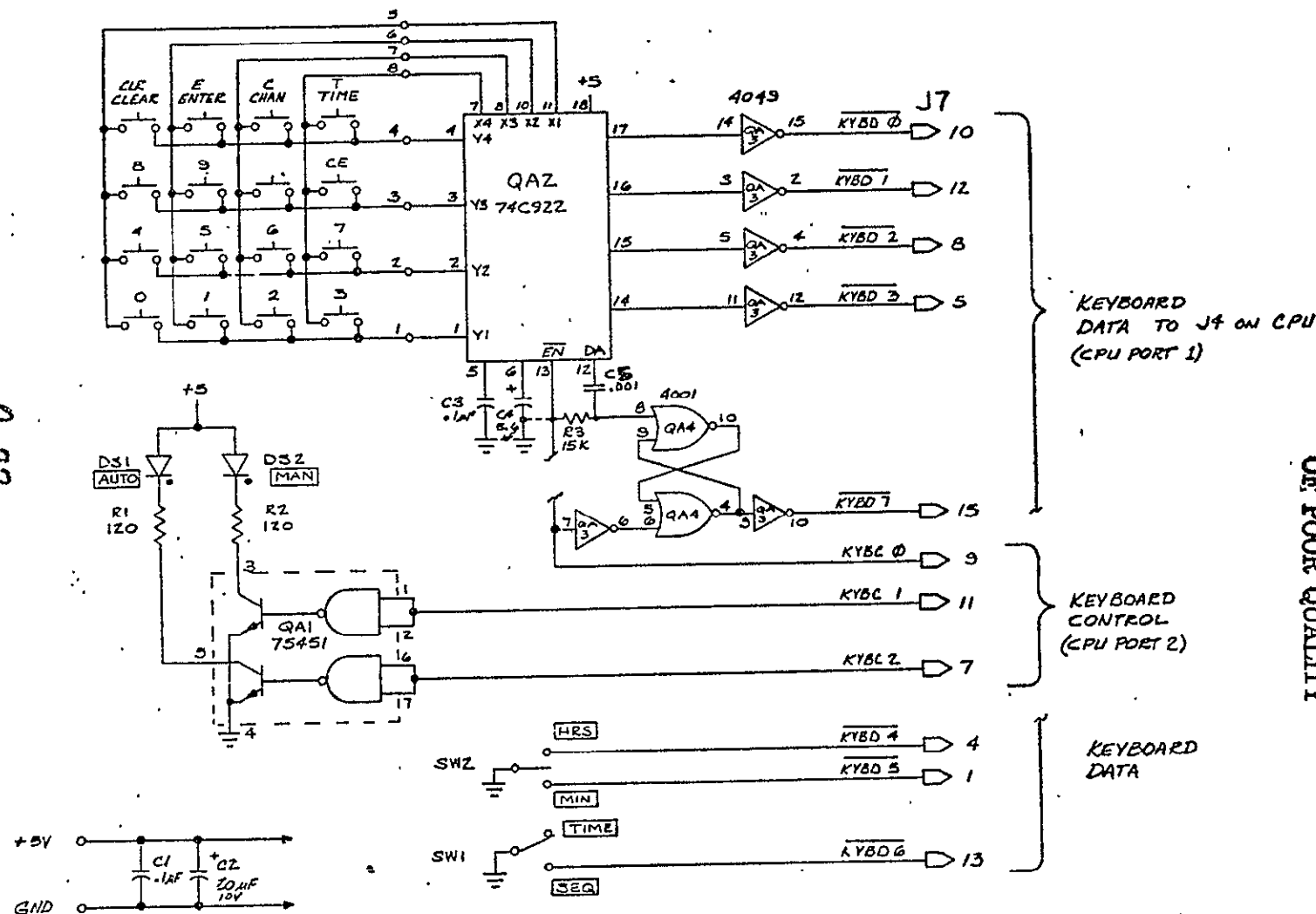
REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REVISION
40048466	A/W AND SPEC	-1
97470104-04	SCHEMATIC	RE
97470104	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS X .01 XX .03 XXX .010 ANGLES ±2° BREAK SHARP EDGES .010 MAX.	DRAWN <i>T. Shuler</i>	DATE 5/12/77
	CHK	DATE
	ENGR	DATE
	HFG	DATE
	PROJ. ENGR	DATE
SEE LIST OF MAT'L	APPROVED <i>A-76</i>	CONTR NO. DN-012477
NEXT ASSY 82	USED ON PROGRAM CONTROLLER	

FAIRCHILD INSTRUMENTATION		TITLE ASSEMBLY - OUTPUT CARD	
SIZE A	CODE IDENT NO.	DWG NO. 97470104	REV 1
SCALE 1/1	SHEET 1 OF 1		



NOTE: +5VOLT AND GND RETURN SUPPLIED BY TWISTED PAIR TO POWER SUPPLY.

Figure 7.14

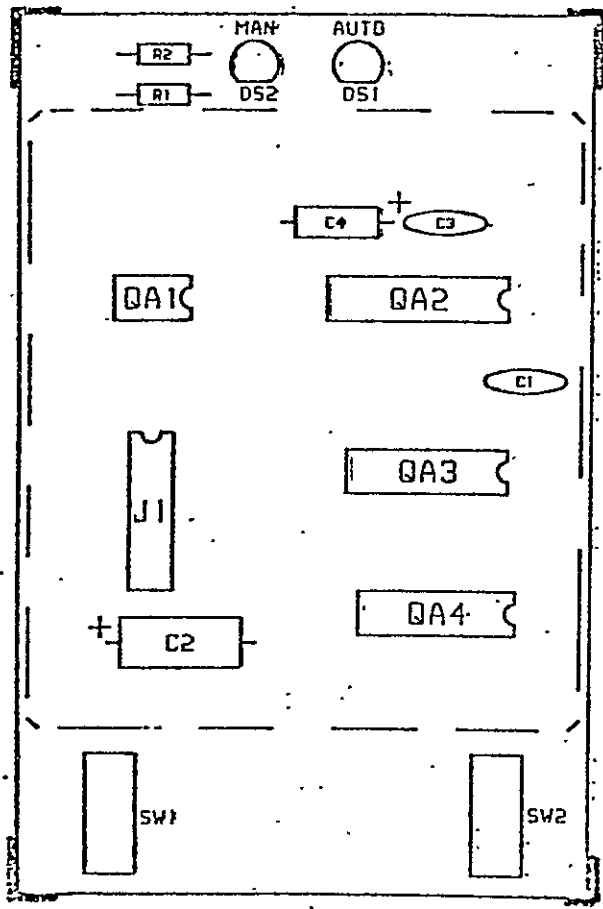
REVISIONS			
DATE	BY	DESCRIPTION	APPROVAL
1	CC	RELEASE TO MFG FOR EN	

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OF POOR QUALITY

ITEM NO		QTY	PART NUMBER	DESCRIPTION				
UNLESS OTHERWISE SPECIFIED:				DRAWN	DATE	FAIRCHILD INSTRUMENTATION		
DIMENSIONS ARE IN INCHES TOLERANCES ON ANGLES ± .1°				CHK	DATE			
DECIMALS				ENGR	DATE	TITLE		
20 1/16 3/32 1/8 1/4 3/8 1/2 5/8 3/4 7/8 1				MFG	DATE			
MATERIAL				PROJ. ENGR	DATE	SCHEMATIC- RHO SIGMA, KEYBOARD		
FINISH				APPR	DATE			
TREATMENT				APPR	DATE	SIZE C CODE IDENT NO SWS NO 37470112-04		
CONTR NO				SCALE	SHEET 1 OF 1			
APPLICATION								

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVED
1	REL TO MFG PER EN			



PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	RE NO
40048507	A/W AND SPEC	1
97470112-04	SCHEMATIC	RE
97470112-03	LIST OF MAT'L	1

<p>UNLESS OTHERWISE SPECIFIED</p> <p>DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS</p> <p>X ±.1</p> <p>XX ±.03</p> <p>XXX ±.010</p> <p>ANGLES ±2°</p> <p>BREAK SHARP EDGES .010 MAX.</p> <p>QIAL</p> <p>SEE LIST OF MAT'L</p> <p>NEXT ASSY</p> <p>82</p>	DRAWN	DATE
	CHK	DATE
	ENGR	DATE
	MFG	DATE
	PROJ. ENGR	DATE
	APPROV.	

<p>FAIRCHILD</p> <p>INSTRUMENTATION</p>	
<p>TITLE</p> <p>ASSEMBLY -</p> <p>KEY BOARD CARD</p>	
SIZE	CODE IDENT NO
A	
DWG NO	REV
97470112	1

NASA-MSFC

SECTION B

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<u>Drawing No.</u>	<u>Title</u>	<u>Page No.</u>
600-1002	1 of 1 RS600 Tree of Drawings	B 1
600-1000	1 of 2 RS600 PCS Assembly	B 2
600-1000	2 of 2 PCS Assembly Parts List	B 3
No number	1 of 1 CPU Card Rack	B 4
600-20	1 of 1 RS600 Block Diagram	B 5
97470102	1 of 2 Assembly Extender Card	B 6
97470102	2 of 2 Material List	B 7
40048464	1 of 1 PCB Extender Card	B 8
600-3003	1 of 1 Front Panel Mounting Bracket	B 9
600-3002	1 of 2 Model 600 Chassis Assembly	B 10
600-3002	2 of 2 Model 600 Parts List	B 11
600-1001	1 of 2 RS600 Inner Panel Assembly	B 12
600-1001	2 of 2 RS600 Inner Panel Parts List	B 13
97472000	1 of 1 Final Assembly Card	B 14
No number	1 of 1 Final Assembly Parts List	B 15
97472053	1 of 1 Mechanical Assembly Card Cage	B 16
97472000	1 of 1 Mechanical Assembly Parts List	B 17
600-3004	1 of 1 RS600 Card Cage Mounting Bracket	B 18
35108125	1 of 1 Bracket, Side - Card Cage	B 19
35108126	1 of 1 Brace, Card Cage	B 20
35108130	1 of 1 Bracket, Mounting - DDM	B 21
97470101	1 of 2 Assembly, Mother Board	B 22
97470101	2 of 2 Material List, Mother Board	B 23
40048468	1 of 2 Mother Board, Top Side	B 24
40048468	2 of 2 Mother Board, Bottom Side	B 25
97470110-04	1 of 1 Schematic Universal Board	B 26
97470110	1 of 2 Assembly Universal Board	B 27
97470110	2 of 2 Material List, Universal Board	B 28
97470103-04	1 of 1 Schematic, Input Card	B 29
97470103	1 of 2 Assembly Input Card	B 30
97470103	2 of 2 Material List, Input Card	B 31
97470108-04	1 of 1 Schematic A/D Control Card	B 32
97470108-03	1 of 2 Material List, Assy A/D Control Card	B 34
97470108-03	2 of 2 Material List, Assy A/D Control Card	B 35
97470100-04	1 of 1 Schematic, CPU Card	B 36
97470100	1 of 1 Assembly, CPU Board	B 37
97470100-03	1 of 2 Material List, CPU Board	B 38
97470100-03	2 of 2 Material List, CPU Board	B 39

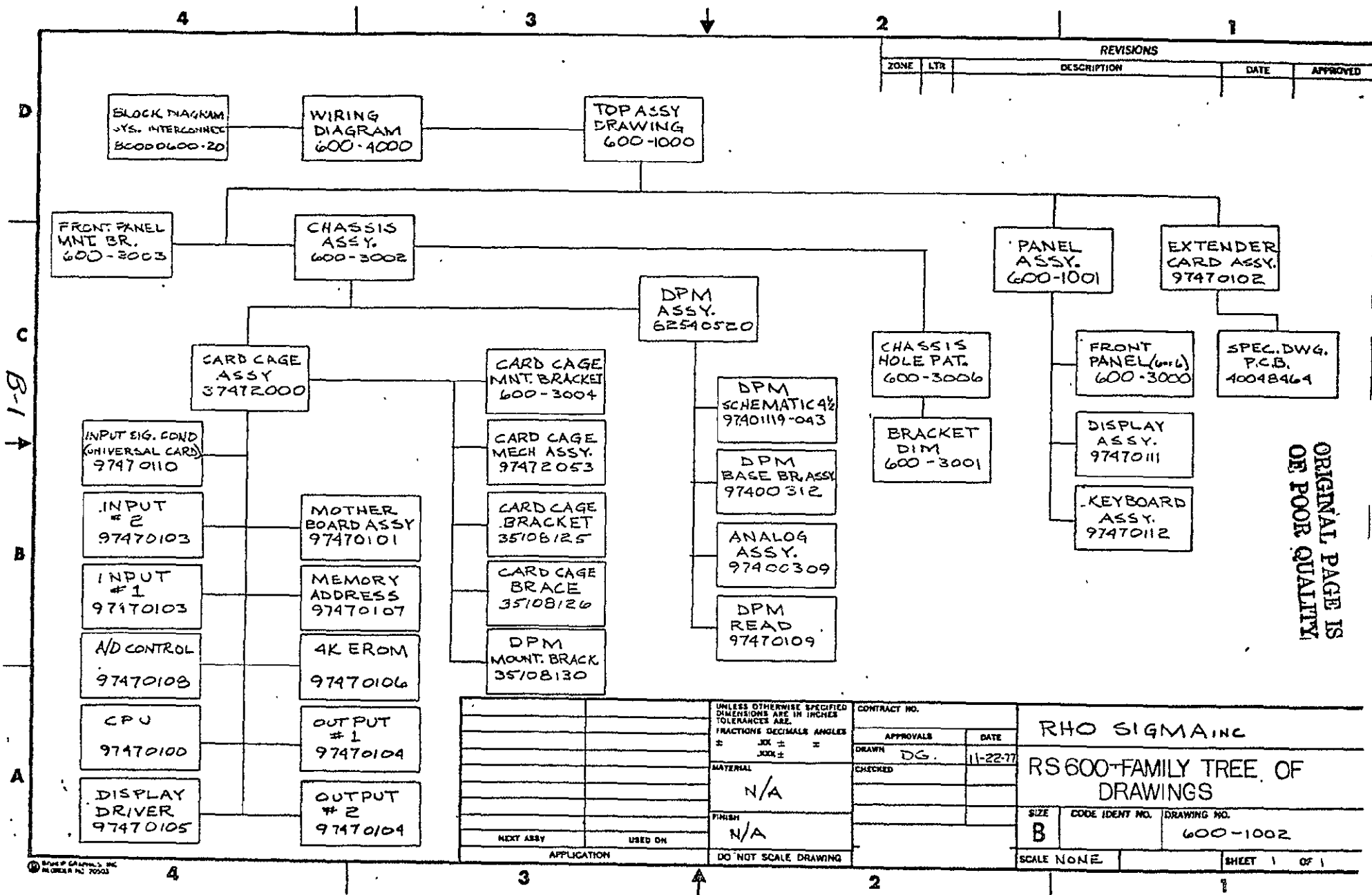
SECTION B

SYSTEM DESIGN DRAWINGS

RS600

PROGRAMMABLE CONTROL SYSTEM

<u>Drawing No.</u>		<u>Title</u>	<u>Page No.</u>
97470105-04	1 of 1	Schematic, Display Driver	B 40
97470105	1 of 1	Assembly, Driver Display Card	B 41
97470105-03	1 of 1	Material List, Assy Driver Display Card	B 42
97470107-04	1 of 1	Schematic Memory Address Card	B 43
97470107	1 of 1	Assembly, Memory Address Card	B 44
97470107-03	1 of 1	Material List, Memory Address Card	B 45
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97470106	1 of 1	Assembly, 4K EROM Card	B 47
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97470104-04	1 of 1	Schematic, Output Card	B 49
97470104	1 of 1	Assembly, Output Card	B 50
97470104-03	1 of 1	Materials List, Output Card	B 51
82540520	1 of 1	4 1/2 AC DPM Assembly	B 52
82540520-03	1 of 1	Material List, 4-1/2 DPM Assy Conn	B 53
97401119-04	1 of 1	Schematic, DPM 4-1/2 AC	B 54
40048395	1 of 1	Baseboard Assembly	B 55
97400312-03	1 of 2	Materials List, Baseboard Assy	B 56
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40048396	1 of 1	Analog Assembly	B 58
97400309	1 of 2	Materials List, Analog Assembly	B 59
97400309	2 of 2	Materials List, Analog Assembly	B 60
97470109-04	1 of 1	Schematic, DPM Read Card	B 61
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97470109-03	1 of 1	Materials List, DPM Read Card	B 63
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97470111-04	1 of 1	Schematic Display Card	B 66
97470111	1 of 1	Assembly Display Card	B 67
97470111-03	1 of 1	Materials List, Display Card	B 68
97470112-04	1 of 1	Schematic, Keyboard	B 69
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600-3000	1 of 6	RS600 Front Panel	B 72
600-3000	2 of 6	Mounting Pattern Display PCB	B 73
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600-3000	4 of 6	Hole Patterns for Switches, Lights, Fuse, Key Switch	B 75
600-3000	5 of 6	Diagram RS600 Controller	B 76
600-3000	6 of 6	CCO-3000	B 77

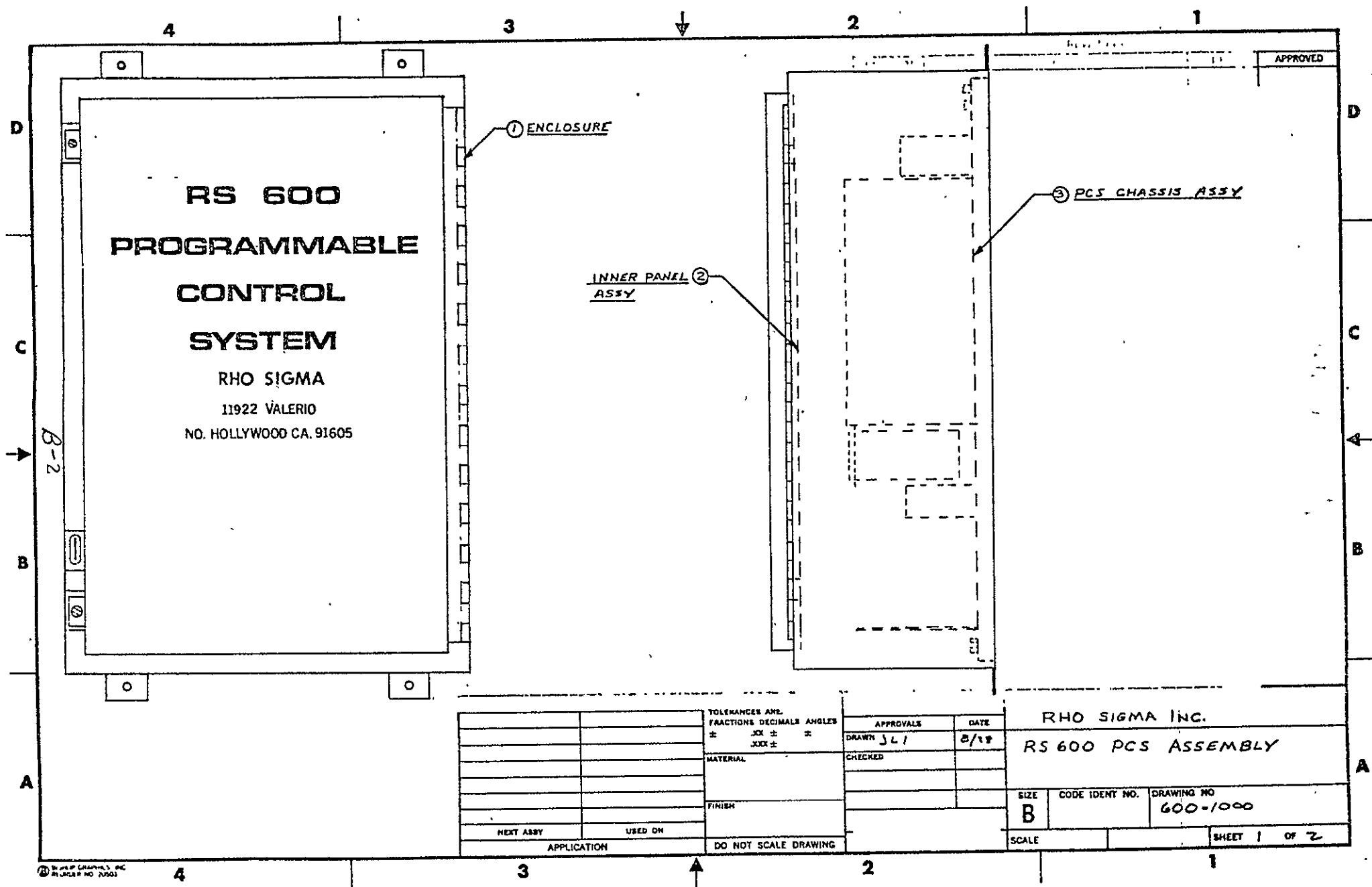


REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

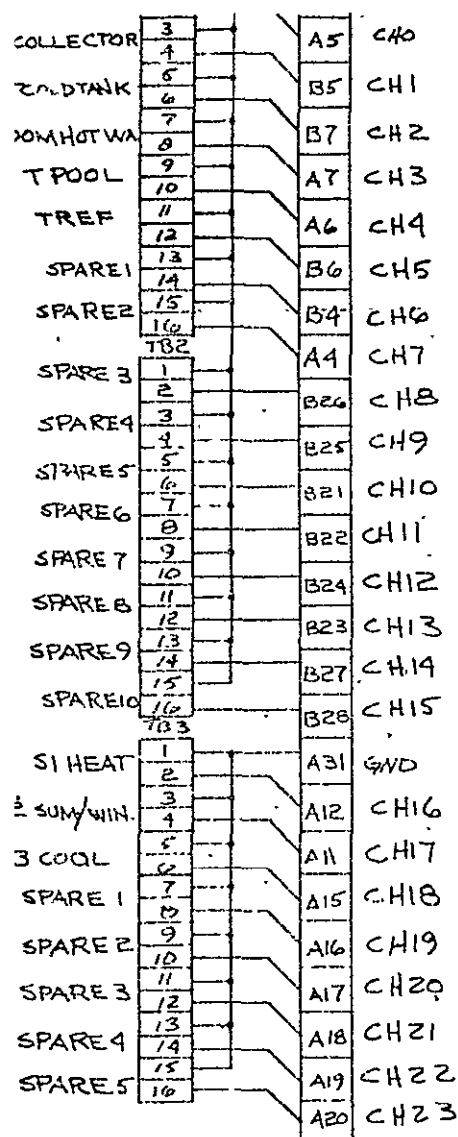
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<div>UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .005 ± .005 ± .005</div>		CONTRACT NO.	
		APPROVALS	DATE
		DRAWN DG.	11-22-77
		CHECKED	
MATERIAL N/A		FINISH N/A	
NEXT ASSY		USED ON	
APPLICATION		DO NOT SCALE DRAWING	

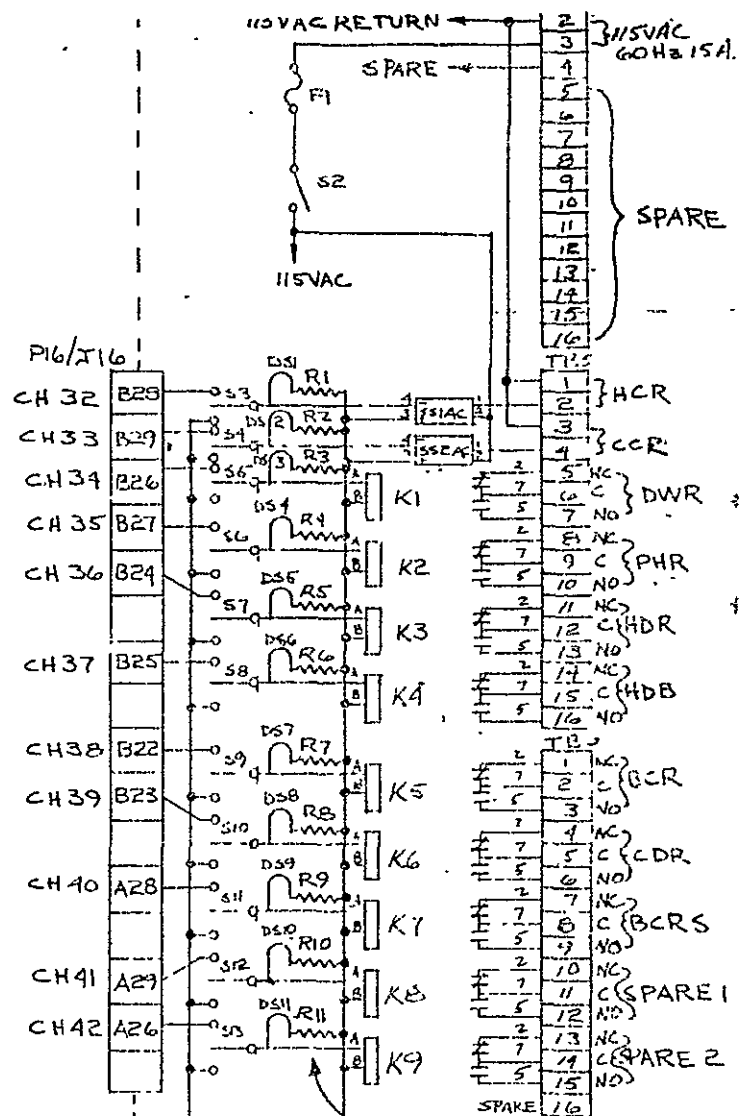
RHO SIGMA INC		
RS 600-FAMILY TREE OF DRAWINGS		
SIZE B	CODE IDENT NO.	DRAWING NO. 600-1002
SCALE NONE		SHEET 1 OF 1



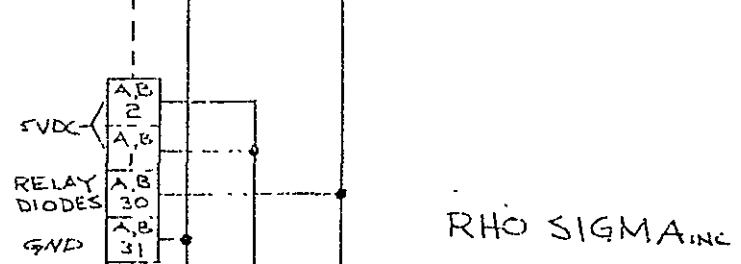
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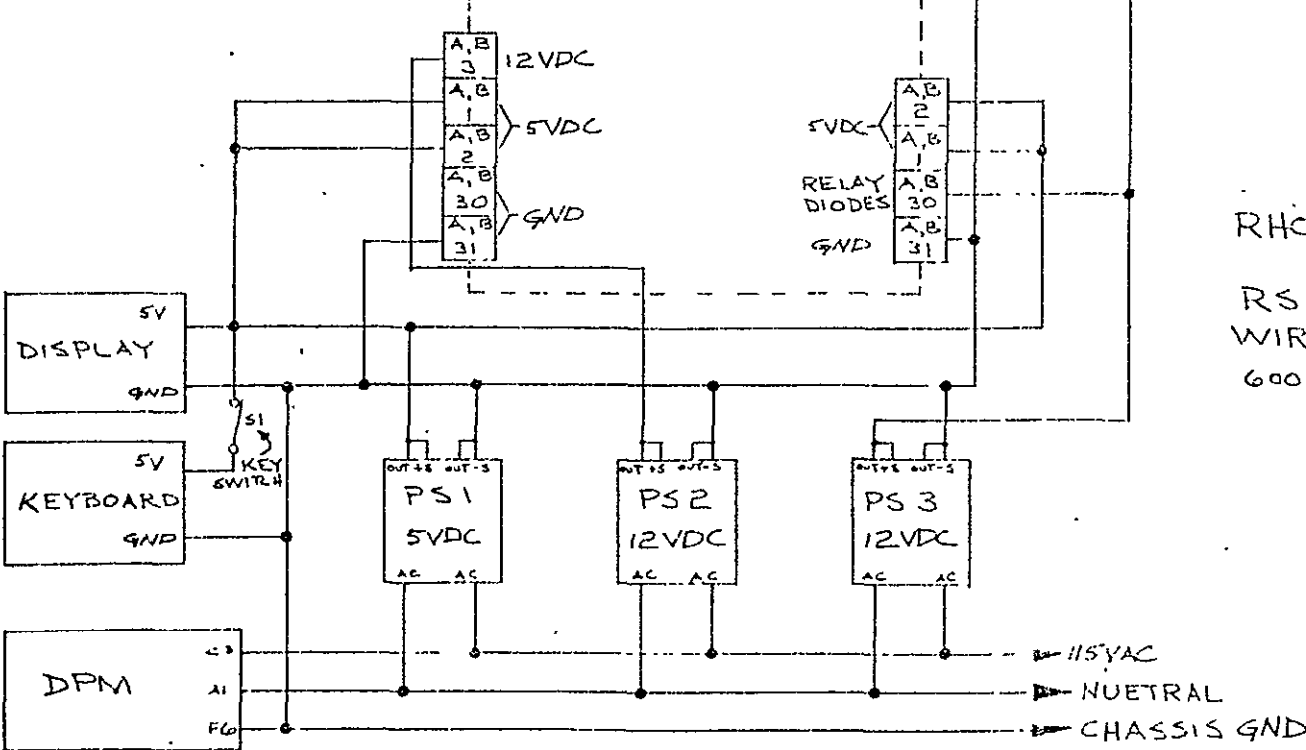
CPU CARD RACK



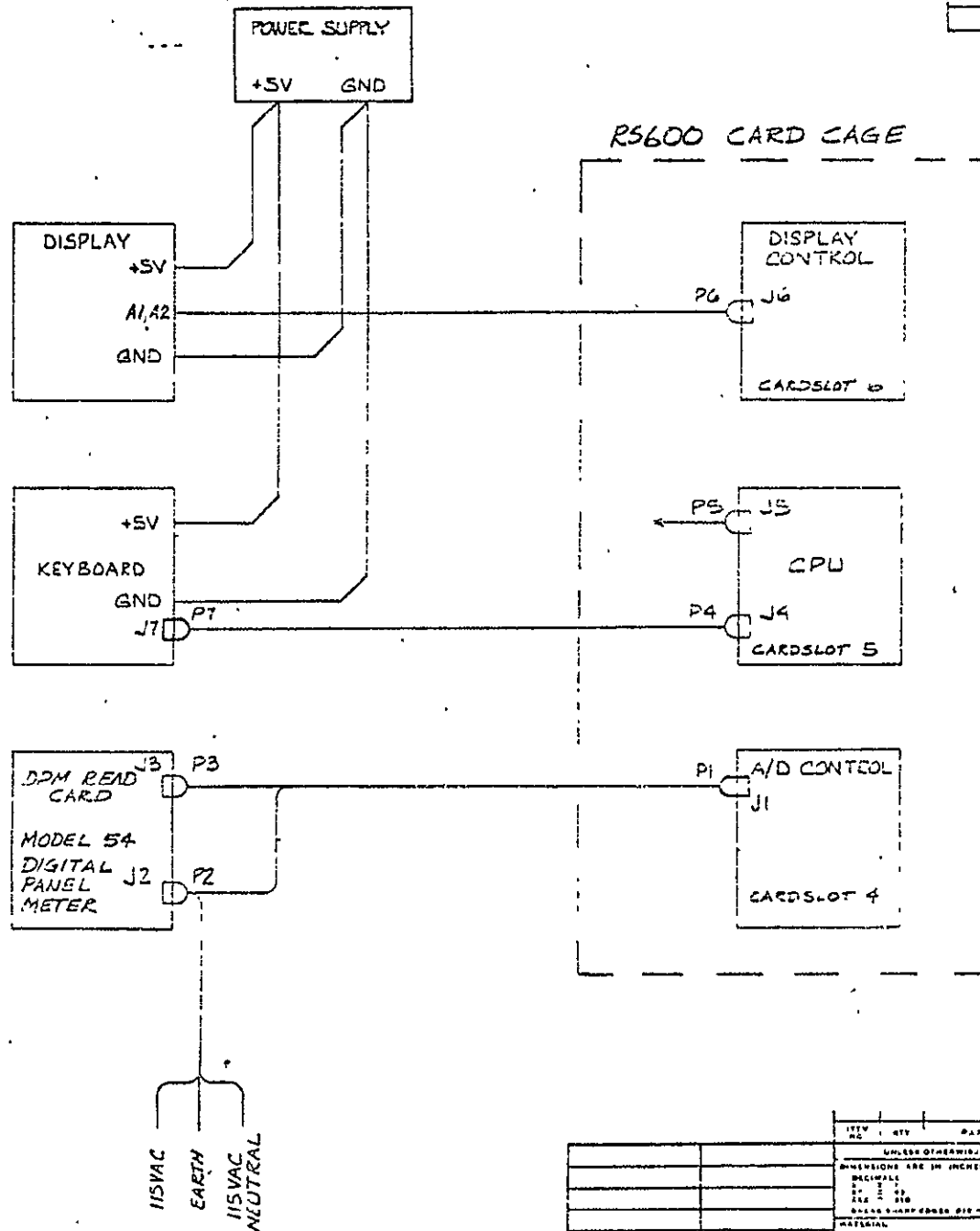
NOTE: RESISTORS ARE 820Ω 4W 5%



RHO SIGMA INC
 RS 600
 WIRING DIAGRAM
 600-4000



REVISIONS					
ZONE	REV	DESCRIPTION	BY	DATE	APPR
	1	RELEASED TO MFG PER EN	BL		



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OF POOR QUALITY

12 . 1977

ITEM NO.		QTY	PART NUMBER	DESCRIPTION	
UNLESS OTHERWISE SPECIFIED				BY DATE	FAIRCHILD SEMICONDUCTOR CORP MILITARY DIVISION
DIMENSIONS ARE IN INCHES TOLERANCES ON				CHK DATE	
DECIMALS 0.1 0.05 0.01 0.005 0.001 0.0005				ENG DATE DATE	
DRAWN - CHECKED BY MTC				DATE	BLOCK DIAGRAM - RS-600 CONTROLLER SYSTEM INTERCONNECT
MATERIAL				DATE	
UNIT				PROJ. ENG. DATE	C 80000600-20
NEXT ASSY				APPROV. DATE	
USED ON				DATE	SCALE SHEET
APPLIC. NO.				CONT. NO. EN-212477	SHEET OF

Y

The image shows a technical drawing of a rectangular plate. On the left side, there is a vertical scale with numbers 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, and 30. At the top right, there are two circular features labeled Q1 and Q2. Q1 is a small circle, and Q2 is a larger circle. Between them are two small rectangular features, each with a horizontal line and a vertical line, resembling a cross or a small rectangle. The drawing is a black and white line drawing with a thick border.

PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048464	A/W AND SPEC	1
97470102	LIST OF MAT'L	1

~~CONFIDENTIAL~~
 HX-GRCHILD NY - 4 1971
~~CONFIDENTIAL~~
 FOR DOCUMENTATION

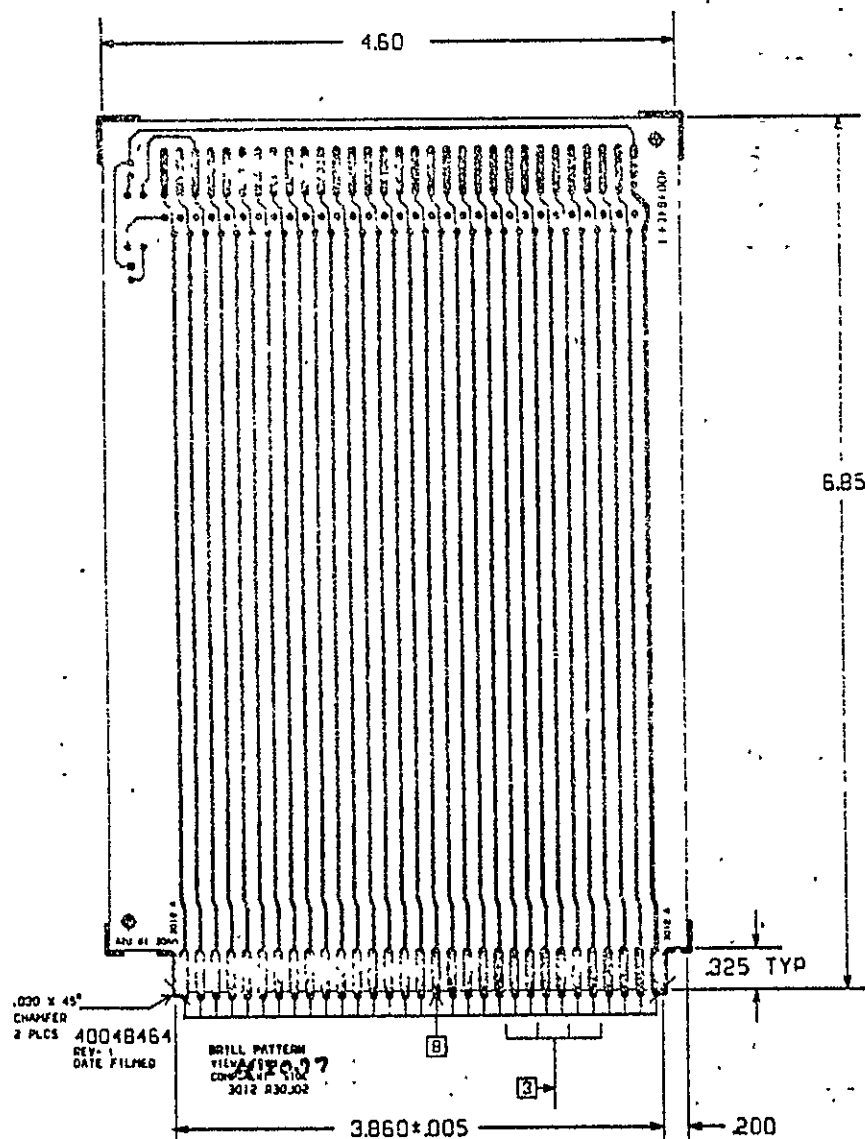
UNLESS OTHERWISE SPECIFIED		DRAWN <i>7-1 Shanks</i>		DATE <i>7/24</i>
DIMENSIONS ARE IN INCHES, TOLERANCES ON DECIMALS ANGLES X $\pm .1$ XX $\pm .03$ $\pm 2^\circ$ XXX $\pm .010$ BREAK SHARP EDGES .010 MAX.		EMP		CAGE
MATERIAL SEE LIST OF MAT'L		ENGR <i>D. W. CORBIN</i>		DATE <i>10/22/72</i>
		MFG		DATE
		PARTS (ENG)		DATE
NEXT ASSY <i>82</i>				<i>B-6</i>

TITLE ASSEMBLY -
EXTENDER CARD

SIRE A	COMP. NO. 100	REV 1
-----------	---------------	----------

PAGE 1 OF 1

[illegible]



REVISION

REV	DESCRIPTION	BY	DATE
1	ENG. MODEL	DC	4-17-77

9. GOLD PLATE FINGERS PAR 62.
 [8] FINGER EDGES PAR 40.
 7. HOLE SIZE PAR 33.
 6. SILKSCREEN PAR 50.
 5. SOLDER RESIST PAR 31.
 4. SOLDER PLATE PAR 69, 611.
 [3] NOTCH . PAR 81, 4 EACH
 2. MATERIAL PAR 711, 724, 731.
 1. GENERAL PAR 10, 20, 30.

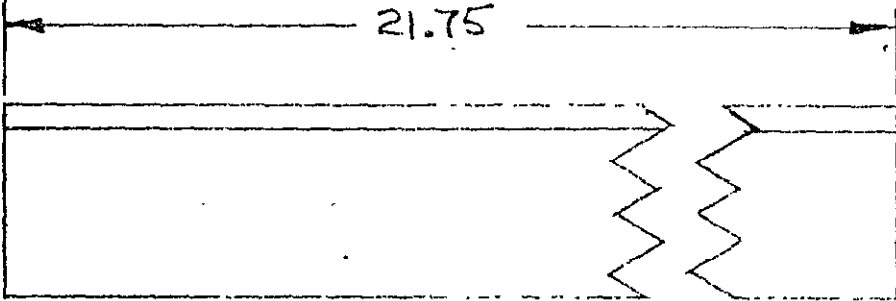
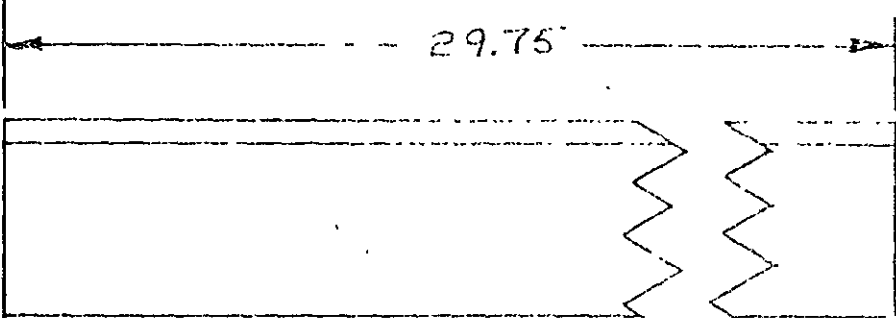
NOTES, PER FS 67095639

HOLE SCHEDULE			TOLERANCE
PIN	DIST. FROM	Ø"	DECIMAL
UNMATED	14 ± .015 DIA	.50	3 1.1
B	856 ± .002 DIA		XX 2 .01
C	125 ± .003 DIA		XXX 2 .002
D			
			ANGLES 22°

FILM REQUIRED		APPLICATION	
DAR PATTERN	X	NEXT LAYER	X
SILSCREEN	X		AN
COMPONENT SIDE	X		
GROUND LAYER			
SOLDER SIDE	X		
SOLDER MASK	X		

T. SHIELDS	4-17-77	SEARCHED INDEXED SERIALIZED FILED FBI - MEMPHIS
		SPEC DWG
		PCB - EXTENDER CARD
		B
		4004846

APPLICATION

NEXT ASSY	USED ON	ITR	DESCRIPTION	DATE	APPROVED
					
					
<p>NOTE: TWO OF EACH PER BOX</p> <p>ORIGINAL PAGE IS OF POOR QUALITY</p>					
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .XX ± .03 ± XXX ±		CONTRACT NO. APPROVALS DRAWN <i>D.G.</i> <i>11/1/71</i> CHECKED		RHO SIGMA INC RS 600 FRONT PANEL MOUNTING BRACKET	
MATERIAL 3 GAGE ALUM. 1 IN CHANNEL				SIZE A	CODE IDENT NO. DRAWING NO 600-3003
FINISH NONE				DO NOT SCALE DRAWING	
		SCALE FULL		SHEET 1 OF 1	

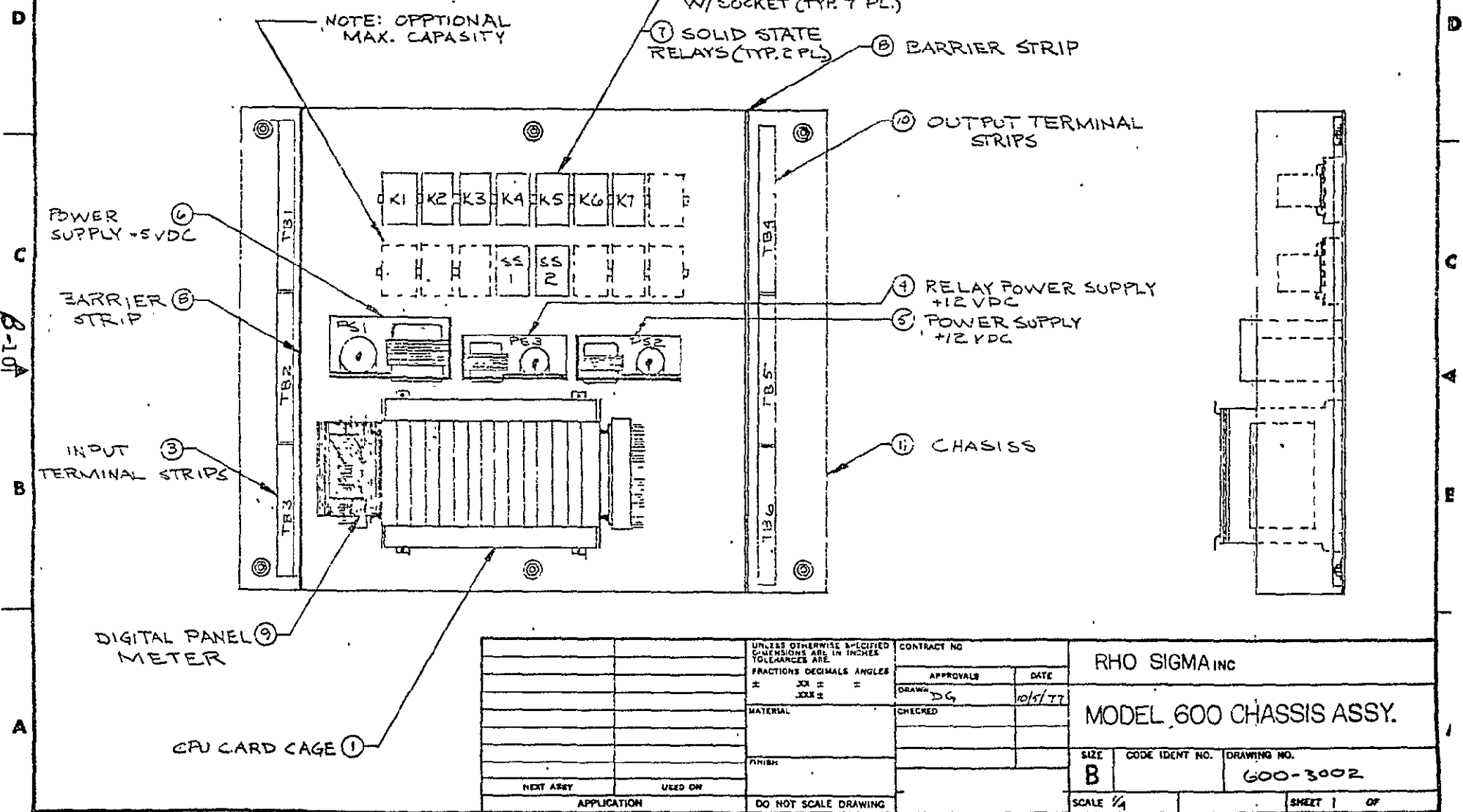
4

3

2

1

REVISIONS				
ZONE	TR	DESCRIPTION	DATE	APPROVED
4		DISCREPTION ADDED	11/18/77	D.G.



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: * .XX ± .XX .XXX ± .XXX		CONTRACT NO.		RHO SIGMA INC MODEL 600 CHASSIS ASSY.	
		APPROVALS	DATE		
		DRAWN D.G.	10/5/77		
		CHECKED			
MATERIAL					
FINISH					
NEXT ASSY		USED ON			
APPLICATION		DO NOT SCALE DRAWING			

SIZE B	CODE IDENT NO.	DRAWING NO. 600-3002
SCALE 1/4	SHEET 1 OF	

© RHO SIGMA INC. 1977
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3

2

1

PARTS LIST			RHO SIGMA INC. 11922 Valerio Street No. Hollywood, Ca. 91605						CONTRACT NO.			CODE IDENT. NO. 19133		REV 600-3002	
TITLE: RS600 PC'S CHASSIS ASSY.							REV.	E.O. NO.	DATE	APPROVED	REV.	E.O. NO.	DATE	APPROVED	SHEET 2
CHECKED BY: JLI			APPROVED ESP		DATE 8/29/77										OF 2
FIND NO.	QTY. REQ'D			U. L. IDENT.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	REFERENCE DESIGNATION			SPECIFICATION			RE'		
1	1				97472000	CPU CARD CAGE ASSY.				FAIRCHILD					
2	7				4283 X AX 52-RELAY GY 2.53A-SOCKET	CONTACT RELAY W/SOCKET	K1 THRU K7	SP/DT 10 AMP 12VDC							
3	3			E47811	600-16	TERMINAL STRIPS	TB1, TB2, TB3	KULKA							
4	2				2B15-1.3B	12VDC @1.5A - POWER SUPPLY	PS3, PS2	POWERTEC							
6	1				2C5-6B	5VDC EGA - POWER SUPPLY	PS1	II							
7	2				D127D	SOLID STATE RELAYS 120VAC @ 10AMPS	SS1 & SS2	CRYDOM							
8	2				600-3001	BANANA STRIP - AL	RHO SIGMA								
9	1				MODEL 54-AC	DIGITAL PANEL METER	DPM	FAIRCHILD							
10	3			E47811	600-16	TERMINAL STRIPS	TB4, TB5, TB6	KULKA							
11	1				600-3002	CHASSIS									
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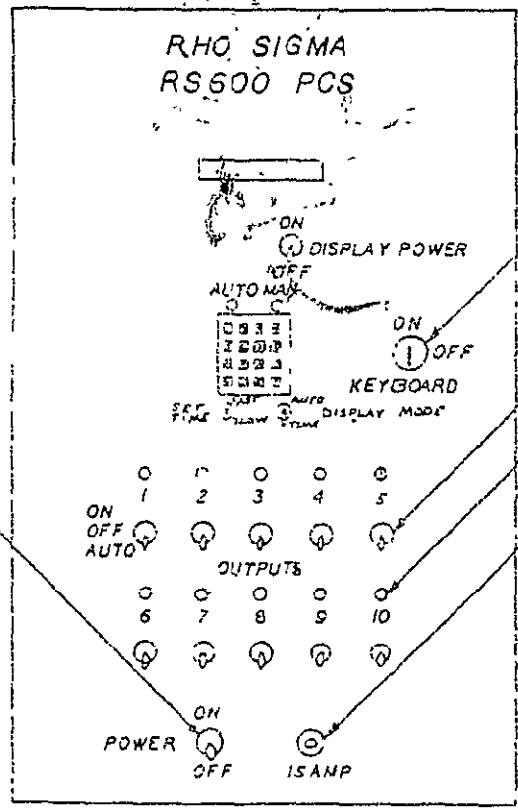
4

3

2

1

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



⑤ INNER PANEL PLATE

④ KEY SWITCH

③ TOGGLE SWITCH (TYP 10 PL)

⑥ LED INDICATORS (TYP 10 PL)

⑦ FUSE HOLDER

TOGGLE SWITCH ③

① DISPLAY ASSY

② KEYBOARD ASSY

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACTIONS DECIMALS ANGLES ± .XX ± .XX ± .XX		CONTRACT NO.		RHO SIGMA INC.	
		APPROVALS	DATE		
MATERIAL		DRAWN	JLI	8/22/77	RS600 INNER PANEL ASSY
		CHECKED			
FINISH		SIZE		CODE IDENT NO.	DRAWING NO.
		B			600-1001
APPLICATION		SCALE		SHEET / OF 2	

4

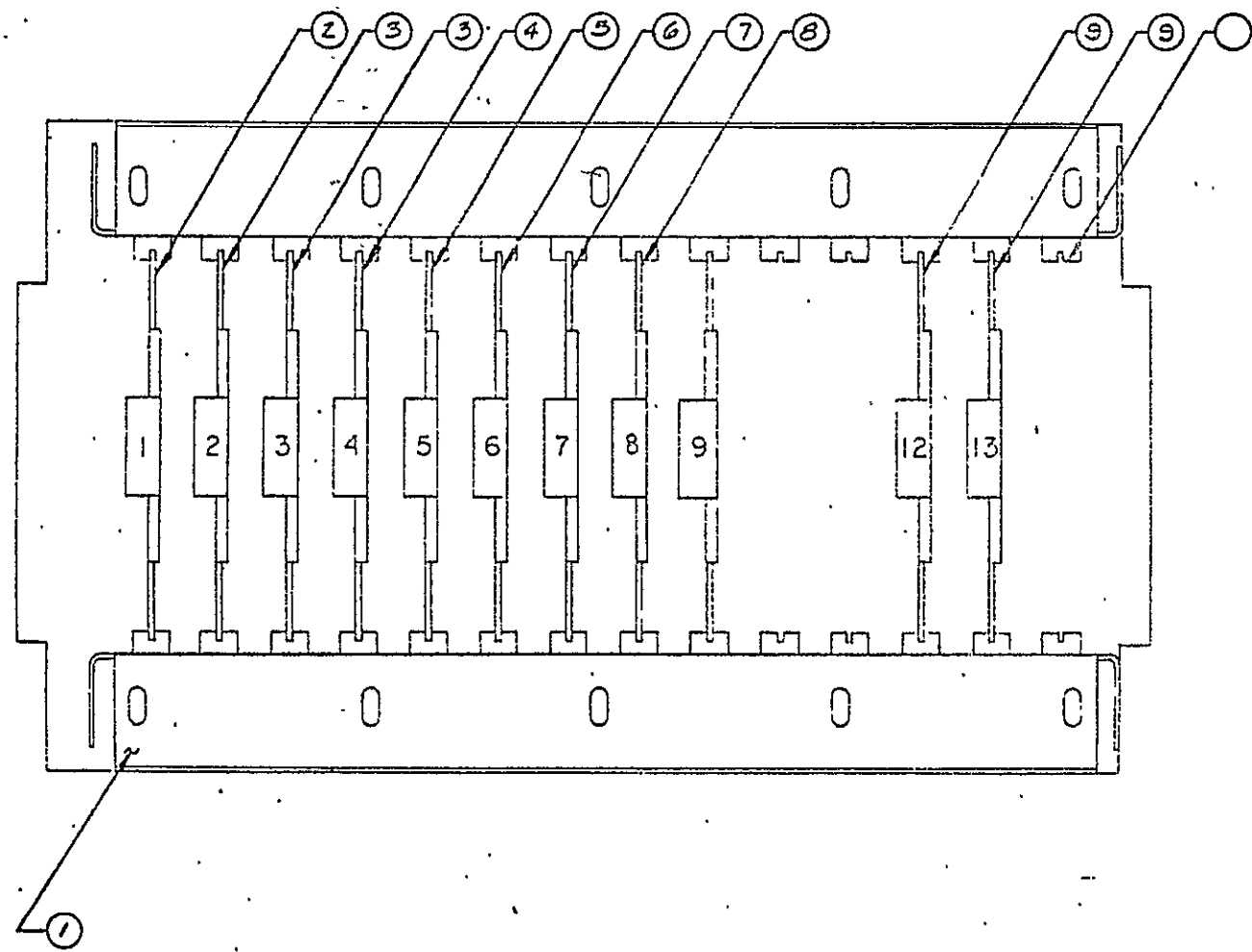
3

2

1

[illegible]

REVISIONS				
DATE	BY	DESCRIPTION	BY	DATE
	1	RELEASE TO MFG FOR EN	66	



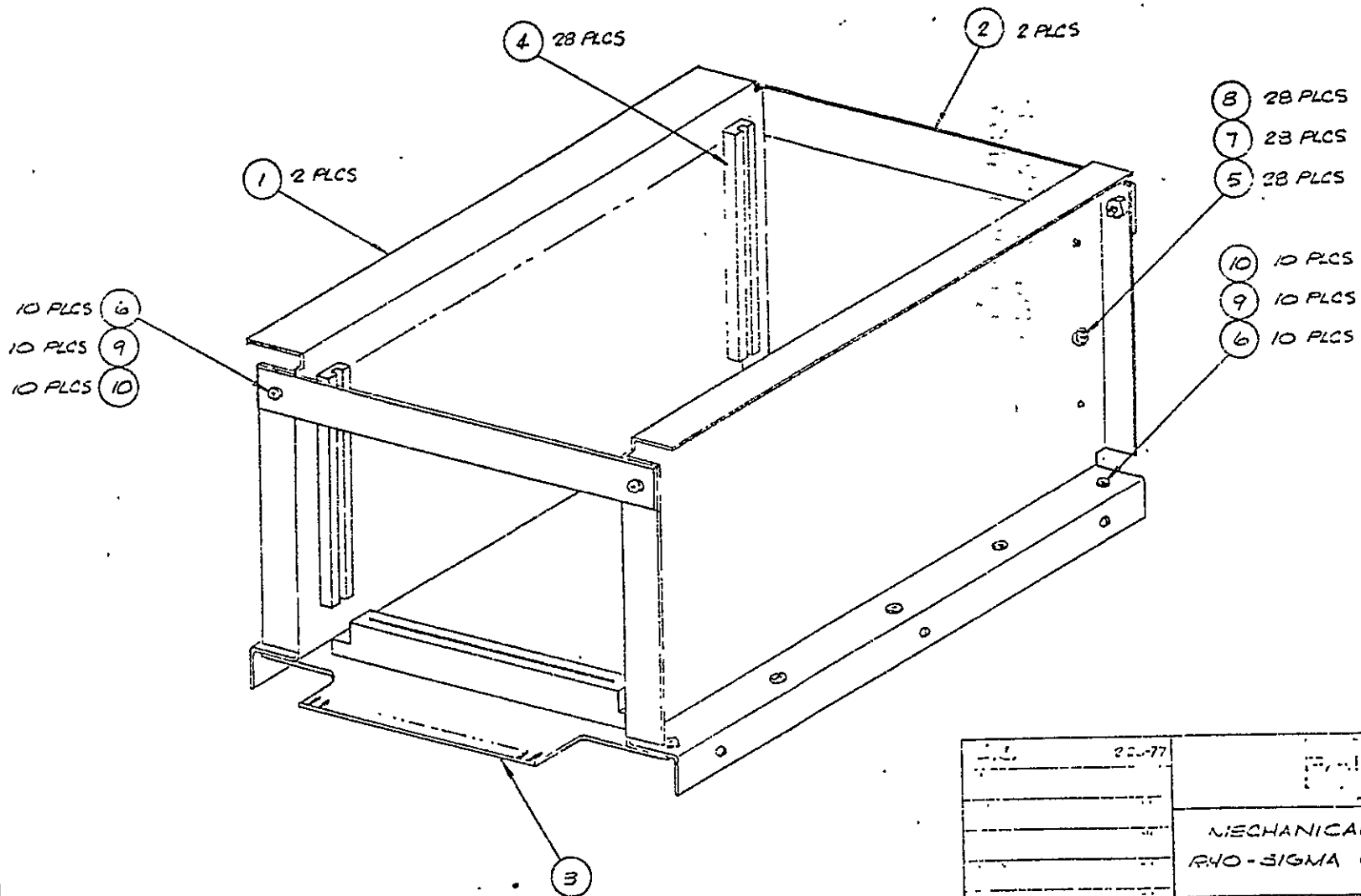
ITEM NO.		QTY	PART NUMBER	DESCRIPTION	
UNLESS OTHERWISE SPECIFIED:				DATE	
DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS				DATE	
FRACTIONS				DATE	
MATERIAL				DATE	
SEE L/M				DATE	
FINISH				DATE	
TREATMENT				DATE	
NEXT ASSY				DATE	
USED ON				DATE	
APPLICATION				DATE	
DRAWN				DATE	
CHKD				DATE	
DESIGNED				DATE	
APP'D				DATE	
TITLE				DATE	
FAIRCHILD				DATE	
INST. VENTILATION				DATE	
FINAL ASSY, CACO CAGE				DATE	
RS-600 CONTROLLER				DATE	
CAGE		CODE IDENT NO.	QTY	DATE	DATE
C		37472000	1	DATE	DATE
SCALE		FULL	SHEET 1 OF 1		

B-14

1977

PAGE 1 OF 1

[illegible]

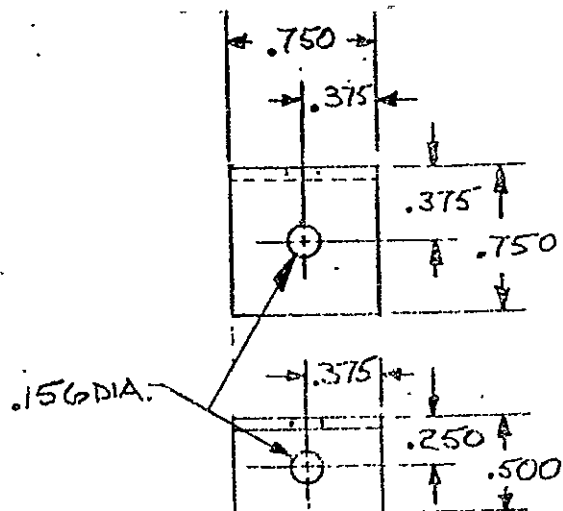


25-77		PARTS LIST	
MECHANICAL ASSY, RHO-SIGMA CARD CAGE			
B		97472053	
NONE			OF

PAGE 7 OF 7

LN NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY	CHK	MFG ENG	DATE
97472000		-03			ASSY, MECH-CARD CAGE					
ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUM			
							REV	EN	NO	
1	35108125		2		BRACKET, SIDE					
2	35108126		2		BRACE, CARD CAGE					
3	97470101		1		MOTHER BOLRD					
4	64018490		28		CARD GUIDE					
5	60516490		28		SCREW, 6-32x3/16, PH					
6	60516580		14		SCREW, 8-32x3/8, PH					
7	62106390		28		LKWASHER, #6					
8	62003670		28		FLATWASHER, #6					
9	62003680		14		FLATWASHER, #3					
10	61039450		14		KEPNUT, #8					
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-31-										

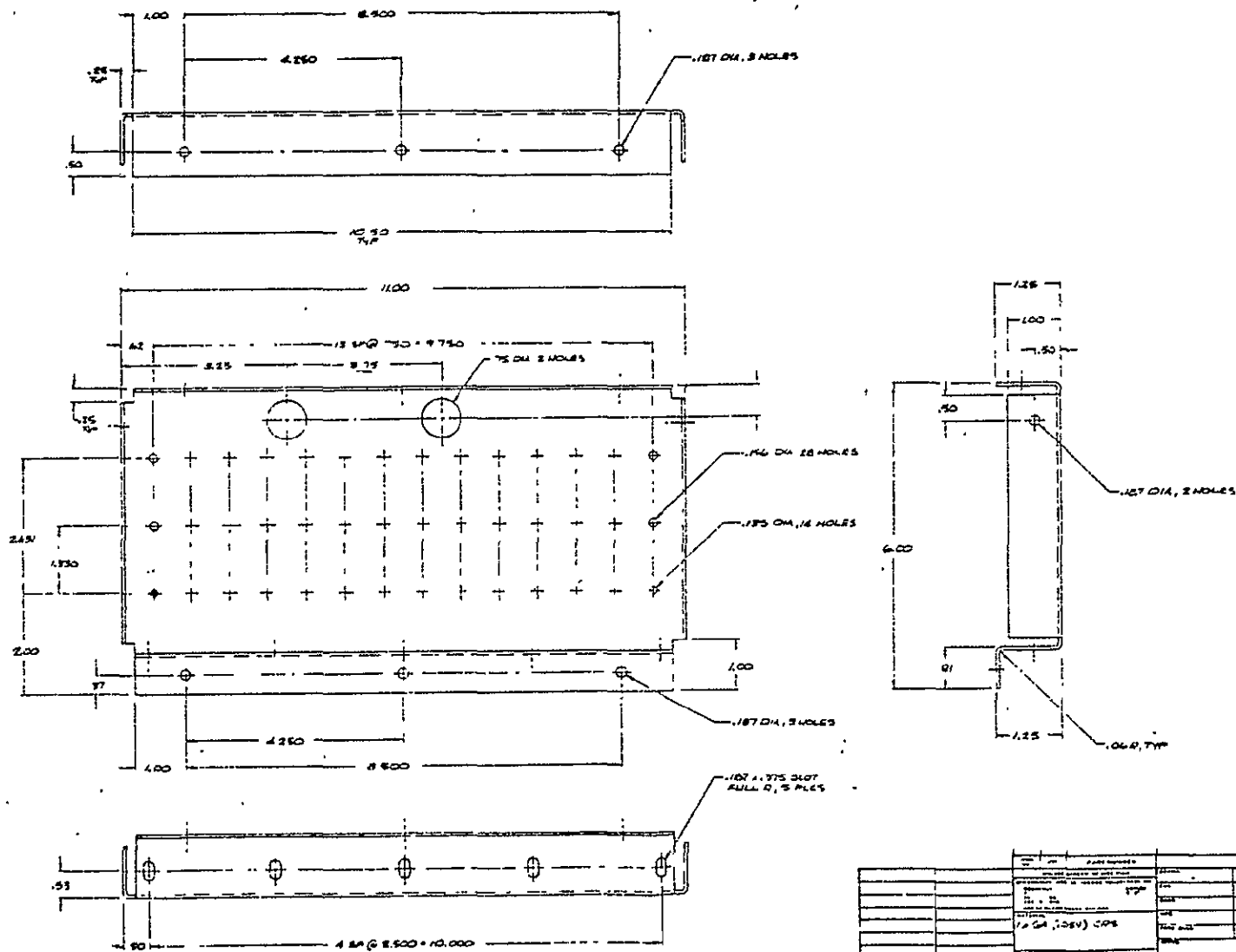
APPLICATION			REVISION		
NEXT ASSY	USED ON	LTR	DESCRIPTION	DATE	APPROVED



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .XX ± ± .XXX ± .020		CONTRACT NO.		RHO SIGMA INC.	
MATERIAL 16 GAGE ---		APPROVALS		DATE	
FINISH NONE		DRAWN D.G.		11/1/77	
DO NOT SCALE DRAWING		CHECKED		RS 600 CARD CAGE MOUNTING BRACKET	
		SIZE A		CODE IDENT NO.	DRAWING NO. 600-3004
		SCALE FULL		SHEET 1	OF 1

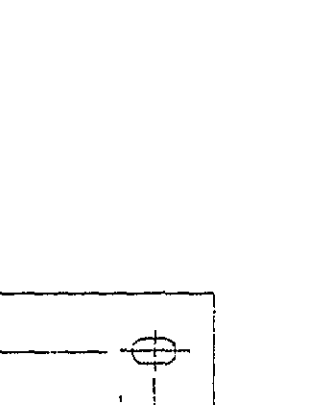

3-19

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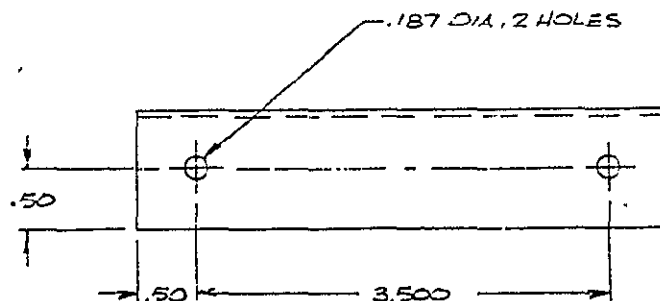
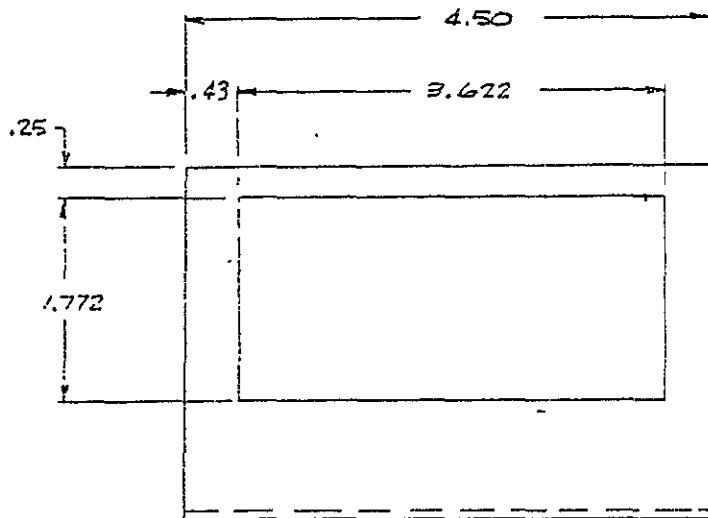
PART NUMBER		DESCRIPTION	
1	BRACKET, SCS - 2000	2	BRACKET, SCS - 2000
3	BRACKET, SCS - 2000	4	BRACKET, SCS - 2000
5	BRACKET, SCS - 2000	6	BRACKET, SCS - 2000
7	BRACKET, SCS - 2000	8	BRACKET, SCS - 2000
9	BRACKET, SCS - 2000	10	BRACKET, SCS - 2000
11	BRACKET, SCS - 2000	12	BRACKET, SCS - 2000
13	BRACKET, SCS - 2000	14	BRACKET, SCS - 2000
15	BRACKET, SCS - 2000	16	BRACKET, SCS - 2000
17	BRACKET, SCS - 2000	18	BRACKET, SCS - 2000
19	BRACKET, SCS - 2000	20	BRACKET, SCS - 2000
21	BRACKET, SCS - 2000	22	BRACKET, SCS - 2000
23	BRACKET, SCS - 2000	24	BRACKET, SCS - 2000
25	BRACKET, SCS - 2000	26	BRACKET, SCS - 2000
27	BRACKET, SCS - 2000	28	BRACKET, SCS - 2000
29	BRACKET, SCS - 2000	30	BRACKET, SCS - 2000
31	BRACKET, SCS - 2000	32	BRACKET, SCS - 2000
33	BRACKET, SCS - 2000	34	BRACKET, SCS - 2000
35	BRACKET, SCS - 2000	36	BRACKET, SCS - 2000
37	BRACKET, SCS - 2000	38	BRACKET, SCS - 2000
39	BRACKET, SCS - 2000	40	BRACKET, SCS - 2000
41	BRACKET, SCS - 2000	42	BRACKET, SCS - 2000
43	BRACKET, SCS - 2000	44	BRACKET, SCS - 2000
45	BRACKET, SCS - 2000	46	BRACKET, SCS - 2000
47	BRACKET, SCS - 2000	48	BRACKET, SCS - 2000
49	BRACKET, SCS - 2000	50	BRACKET, SCS - 2000
51	BRACKET, SCS - 2000	52	BRACKET, SCS - 2000
53	BRACKET, SCS - 2000	54	BRACKET, SCS - 2000
55	BRACKET, SCS - 2000	56	BRACKET, SCS - 2000
57	BRACKET, SCS - 2000	58	BRACKET, SCS - 2000
59	BRACKET, SCS - 2000	60	BRACKET, SCS - 2000
61	BRACKET, SCS - 2000	62	BRACKET, SCS - 2000
63	BRACKET, SCS - 2000	64	BRACKET, SCS - 2000
65	BRACKET, SCS - 2000	66	BRACKET, SCS - 2000
67	BRACKET, SCS - 2000	68	BRACKET, SCS - 2000
69	BRACKET, SCS - 2000	70	BRACKET, SCS - 2000
71	BRACKET, SCS - 2000	72	BRACKET, SCS - 2000
73	BRACKET, SCS - 2000	74	BRACKET, SCS - 2000
75	BRACKET, SCS - 2000	76	BRACKET, SCS - 2000
77	BRACKET, SCS - 2000	78	BRACKET, SCS - 2000
79	BRACKET, SCS - 2000	80	BRACKET, SCS - 2000
81	BRACKET, SCS - 2000	82	BRACKET, SCS - 2000
83	BRACKET, SCS - 2000	84	BRACKET, SCS - 2000
85	BRACKET, SCS - 2000	86	BRACKET, SCS - 2000
87	BRACKET, SCS - 2000	88	BRACKET, SCS - 2000
89	BRACKET, SCS - 2000	90	BRACKET, SCS - 2000
91	BRACKET, SCS - 2000	92	BRACKET, SCS - 2000
93	BRACKET, SCS - 2000	94	BRACKET, SCS - 2000
95	BRACKET, SCS - 2000	96	BRACKET, SCS - 2000
97	BRACKET, SCS - 2000	98	BRACKET, SCS - 2000
99	BRACKET, SCS - 2000	100	BRACKET, SCS - 2000

Technical drawing of a rectangular plate. The overall width is 7.00 and the overall height is 1.00. A slot is located on the top edge, with a width of .1875 and a depth of .375. The slot is positioned .50 from the left edge. The distance from the slot to the right edge is 6.000. The drawing includes a dimension line for the slot width and depth, and a dimension line for the distance from the slot to the right edge. A note indicates the slot dimensions: ".1875 x .375 SLOT FULL R, 2 PLCS".

SYM		DESCRIPTION	BY	DATE	APPROVAL
<div style="display: flex; justify-content: space-around; align-items: center;">   </div>					

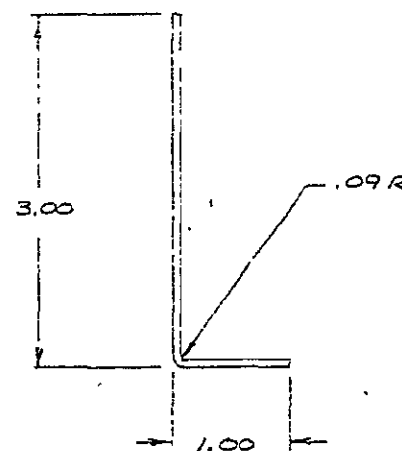
ITEM NO	QTY	PART NUMBER	DESCRIPTION
MATERIAL 1/8 GA (.059) QPS		TOLERANCES AND NOTES UNLESS OTHERWISE SPECIFIED DECIMAL ANGLES: X ± .1 ± 30 XX ± .02 XXX ± .010	DRAWN JC 5-3-77 CKD MECH. ENGR DATE ELEC ENGR DATE MFG DATE PROJ ENGR DATE
TREATMENT		I PERPENDICULAR II PARALLEL O CONCENTRIC - FLAT OR STRAIGHT ✓ SURFACE ROUGHNESS	TITLE BRACE, CARD CAGE
FINISH PAINT SLACK		BREAK ALL SHARP EDGES DTD HAS DO NOT SCALE THIS DRAWING	SIZE B NO. 35108126
NEXT ASSY		MODEL	SCALE SHEET OF REV

B.21



35108/30

REVISIONS				
SYN	DESCRIPTION	BY	DATE	APPROVAL



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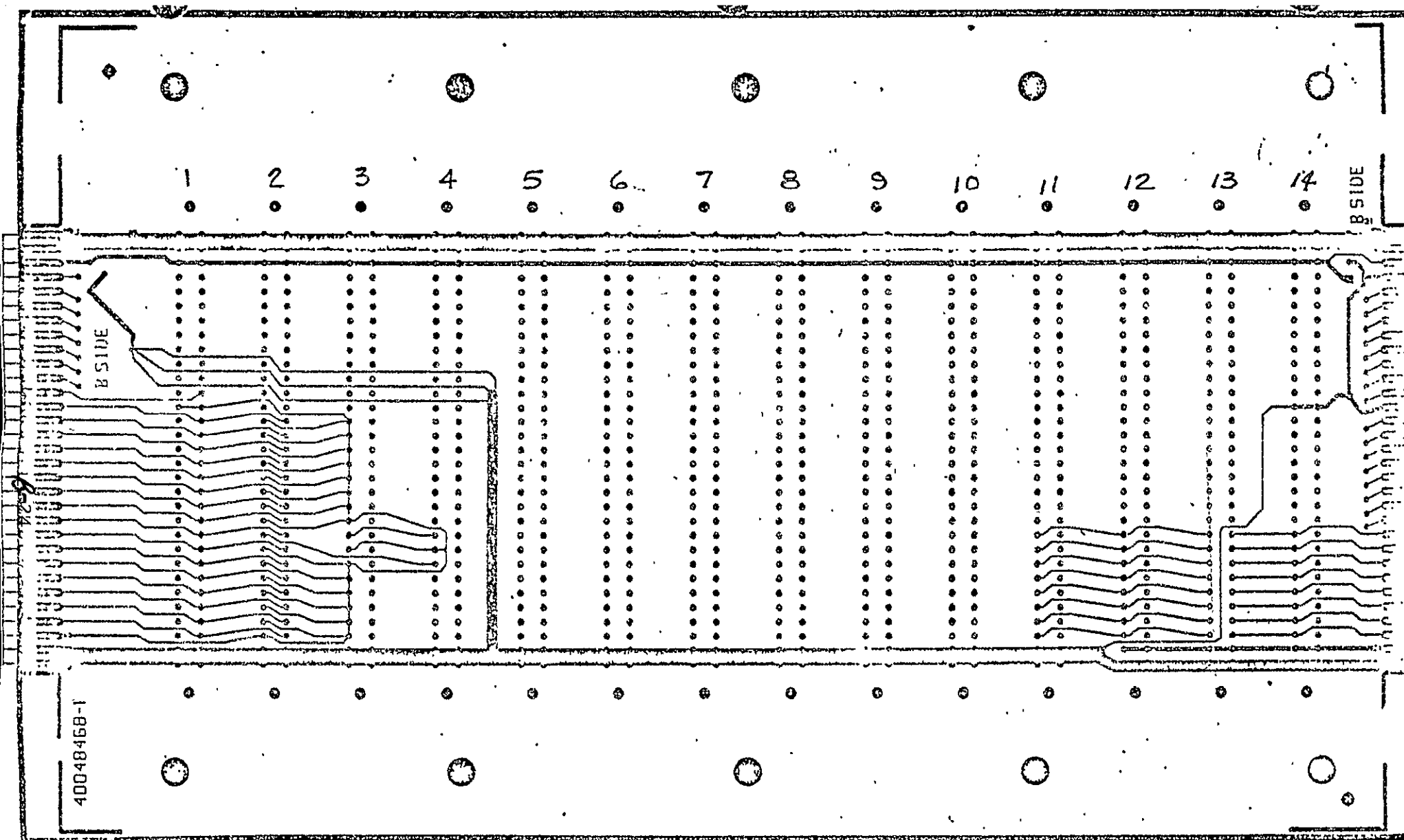
ITEM NO	QTY	PART NUMBER	DESCRIPTION			
MATERIAL 12 GA. (.031) ALUM ED52-432			TOLERANCES AND NOTES UNLESS OTHERWISE SPECIFIED DECIMAL ANGLES 1 ± .1 XX ± .03 XXX ± .010	DRAWN J.L. CRD	DATE	FAIRCHILD INSTRUMENTATION
TREATMENT			1 PERPENDICULAR II PARALLEL O CONCENTRIC ✓ FLAT OR STRAIGHT ✓ SURFACE ROUGHNESS	MECH ENGR	DATE	
FINISH PAINT BLACK			BREAK ALL SHARP EDGES TO MAX DO NOT SCALE THIS DRAWING	ELEC ENGR	DATE	TITLE BRACKET, MOUNTING - OPM
				MFG	DATE	SIZE NO B 35108/30
				PROJ ENGR	DATE	SCALE 1/1 SHEET OF REV.

NOV 04 1977

PAGE 1 OF 1

FAIRCHILD LIST OF MATERIAL

[illegible]



40048458

REV-1

DATE FILMED 4.18.77

COMPONENT SIDE
DRILL PATTERN

MOTHER BOARD TOP SIDE

B-25

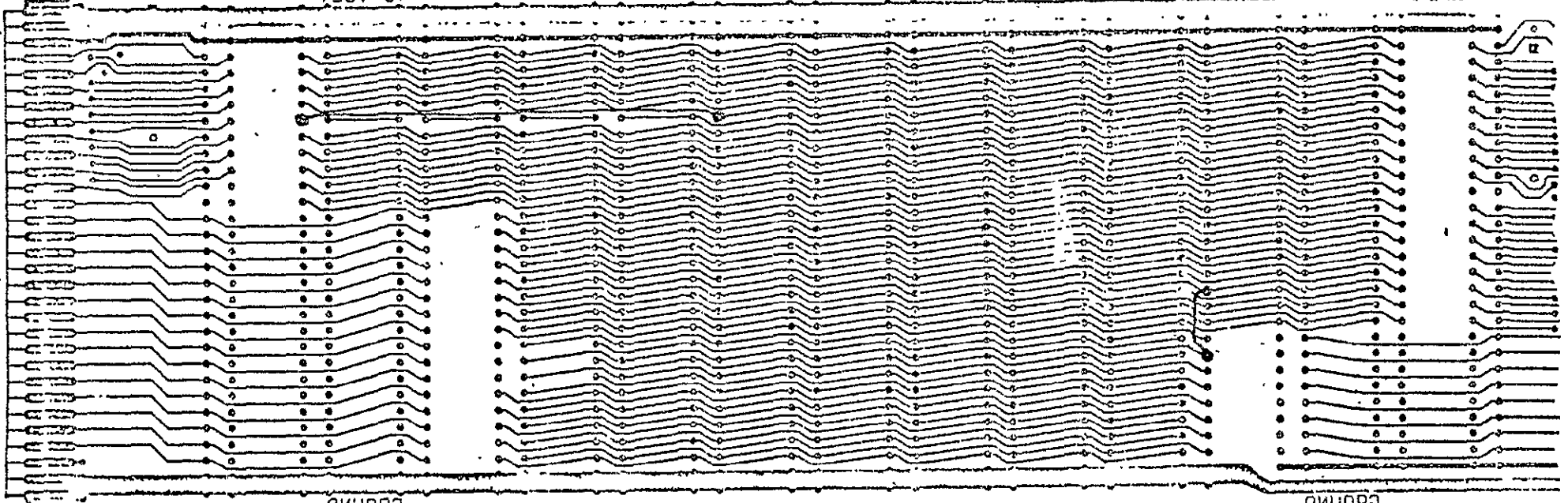
A 2102

1 2 3 4 5 6 7 8 9 10 11 12 13 14

TJ0V 2+

TJ0V 2+

A 2102



GROUND

GROUND

40048468-1

A 2102
MADE IN U.S.A.

40048468
REV-1
DATE FILMED

4.18.77

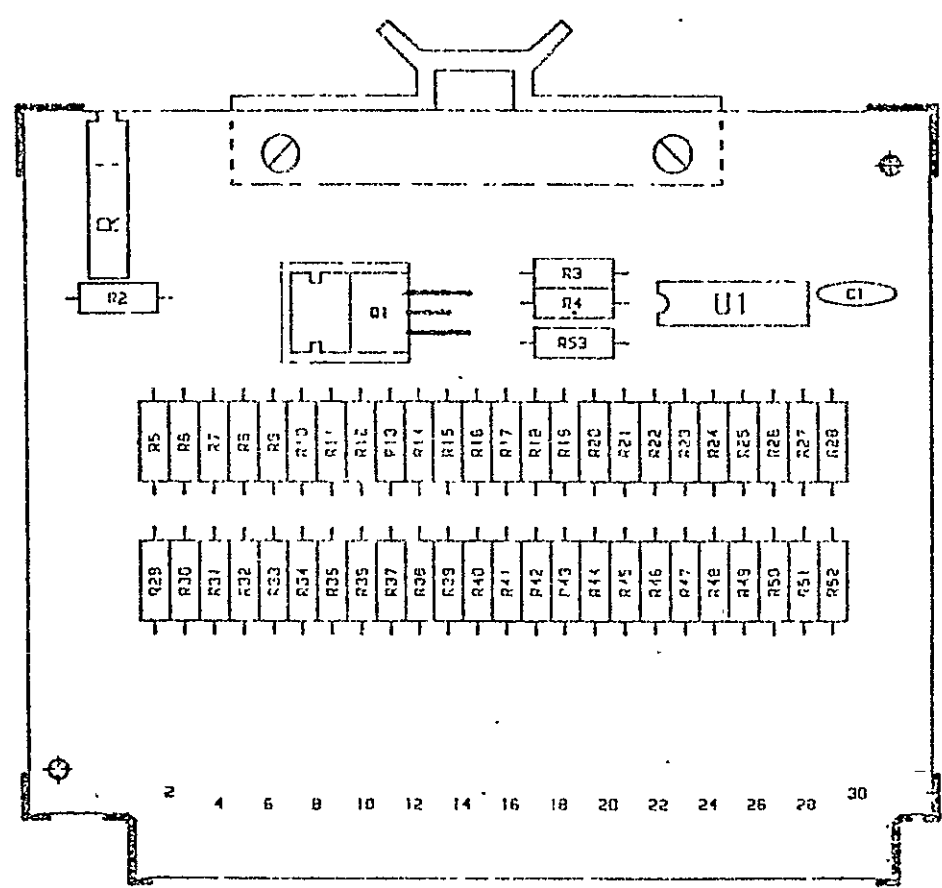
3012 R30J02

DRILL PATTERN

MOTHER BOARD - BOTTOM SIDE AS IF
VIEWED THROUGH THE TOP.

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REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



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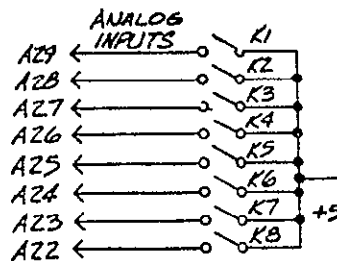
PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048473	A/W AND SPEC	1
97470110-04	SCHEMATIC	REF
97470110	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED	DRAWN	DATE	<div>FAIRCHILD</div> <div>INSTRUMENTATION</div> <div>1977 - 4</div>		
	CHK	DATE			
MATERIAL	ENGR	DATE	<div>ASSEMBLY -</div> <div>UNIVERSAL CARD</div>		
	MFG	DATE			
NEXT ASSY	PRO. ENGR	DATE	<div>SIZE</div> <div>A</div> <div>CODE IDENT NO.</div> <div>97470110</div> <div>DWG NO.</div> <div>97470110</div> <div>REV.</div> <div>1</div>		
	APPROV.	DATE			
USED ON	COPIED NO.	SCALE	SHEET 1 OF 1		
PROGRAM CONTROLLER	DN-012477B-27	1/1			

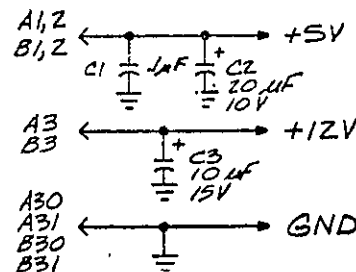
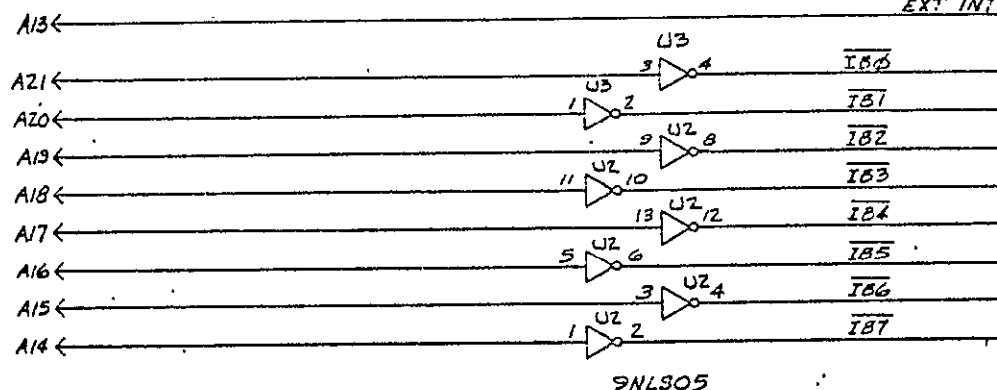
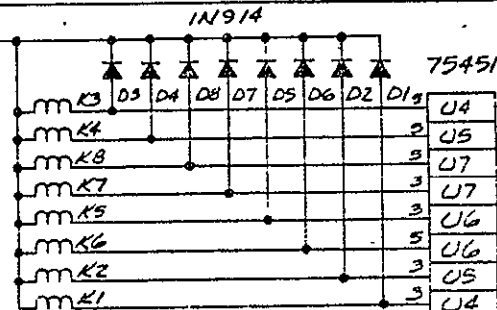
0 4 1977

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY	CHK	MFG ENG	DATE
97470110		-03	01	01	ASSY. UNIVERSAL CARD					
ITEM	PART NO	REV	QTY PER ASSM	U M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT			
							REV	EN	NO	
001	40048473		001	EA	P.C.B. UNIVERSAL CARD					
002	26905801		001	EA	IC UA723	U1				
003			003	EA	TRANSISTOR 2N6124	Q1				
004			001	EA	POT. 1K	R1				
005			001	EA	RES. 1K	R2				
006			001	EA	RES. 62Ω	R3				
007			001	EA	RES. 5.1K	R4				
008			001	EA	RES. .25Ω	R5				
009			048	EA	SELECTED	R5 THRU R52				
010			001	EA	CAP. .001μF	C1				
011			001	EA	CARD, EJECTOR, S.A.E. 6200					

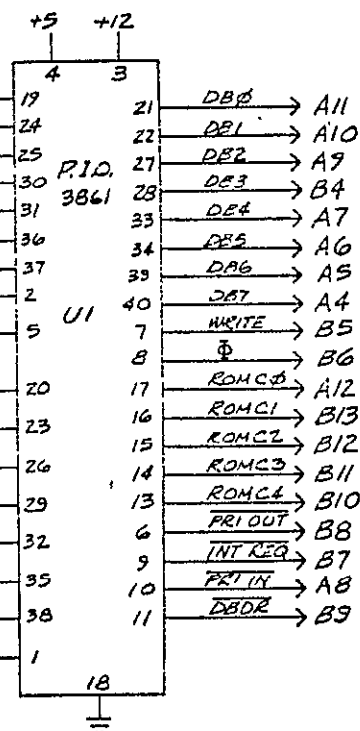


K1 THRU K8
B29 ← RELAY SHIELDS



REVISIONS			
DATE	BY	DESCRIPTION	APPROVAL
1		RELEASE TO MFG PER EN	

INPUT 1 (CARD SLOT 3) TO A/D-B22
INPUT 2 (CARD SLOT 2) TO A/D-B24



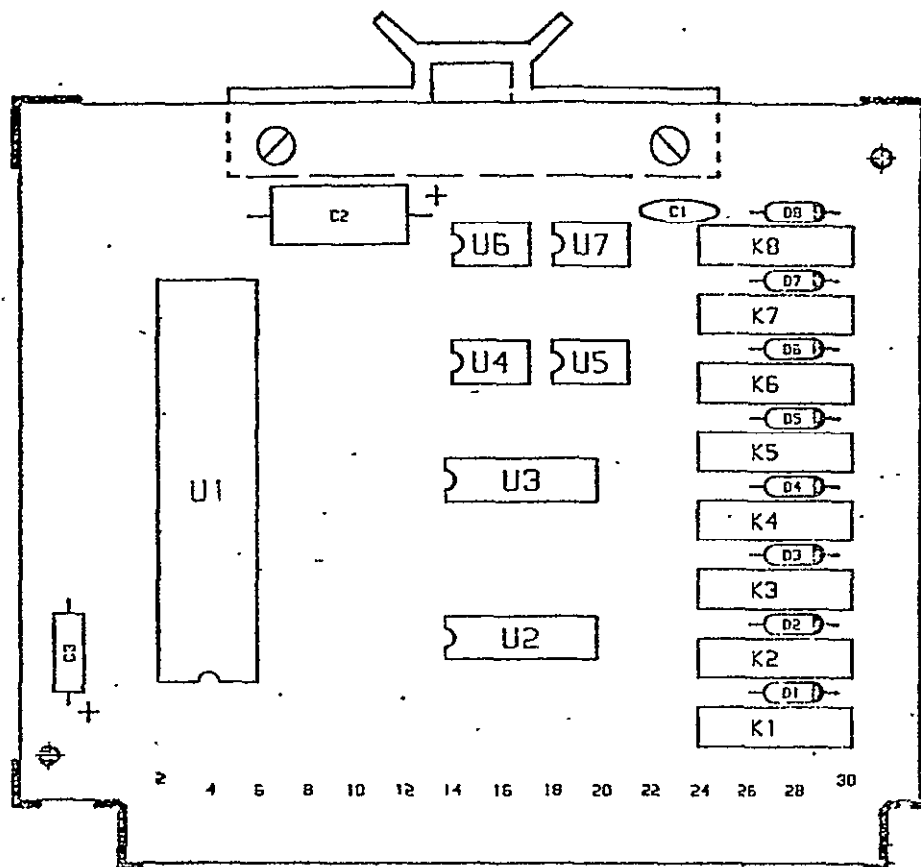
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1977

ITEM NO.	QTY	PART NUMBER	DESCRIPTION
UNLESS OTHERWISE SPECIFIED: <td>DATE 7/1/77</td>			DATE 7/1/77
DIMENSIONS ARE IN INCHES TOLERANCES ON ANGLES			DATE
DECIMALS 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.2 1.5 2.0 2.5 3.0 4.0 5.0 6.0 8.0 10.0 12.5 16.0 20.0 25.0 31.5 40.0 50.0 63.0 80.0 100.0 125.0 160.0 200.0 250.0 315.0 400.0 500.0 630.0 800.0 1000.0			DATE
MATERIAL			DATE
FINISH			DATE
TREATMENT			DATE
NEXT ASSY			DATE
USED ON			DATE
APPLICATION			DATE
DRAWN BY D.W. CORBIN			DATE 7/1/77
CHECKED BY			DATE
APPROVED BY			DATE
SCALE 1/1			DATE
C			DATE
97470103-04			DATE
DN-012477			DATE
1			DATE

SCHEMATIC -
RHO SIGMA;
INPUT CARD

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048465	A/W AND SPEC	1
97470103-04	SCHEMATIC	REF
97470103	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED		DRAWN <i>H. Shuler</i>		DATE <i>8/25</i>		FAIRCHILD INSTRUMENTATION DIV - 4 1977	
DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS		CHK		DATE			
X = .1		ENGR <i>D.W. CORBIN</i>		DATE <i>10/25/77</i>			
XX = .03		MFG		DATE			
XXX = .010		PROJ. ENGR		DATE		TITLE ASSEMBLY - INPUT CARD	
MATERIAL SEE LIST OF MAT'L		APPROV.		SIZE A		CODE IDENT NO 97470103	
NEXT ASSY 82		CONTR NO. <i>DAI-012477</i>		SCALE 1/1		REV 1	
USED IN PROGRAM CONTROLLED		B-30		CUTTY		RF	

FAIRCHILD LIST OF MATERIAL

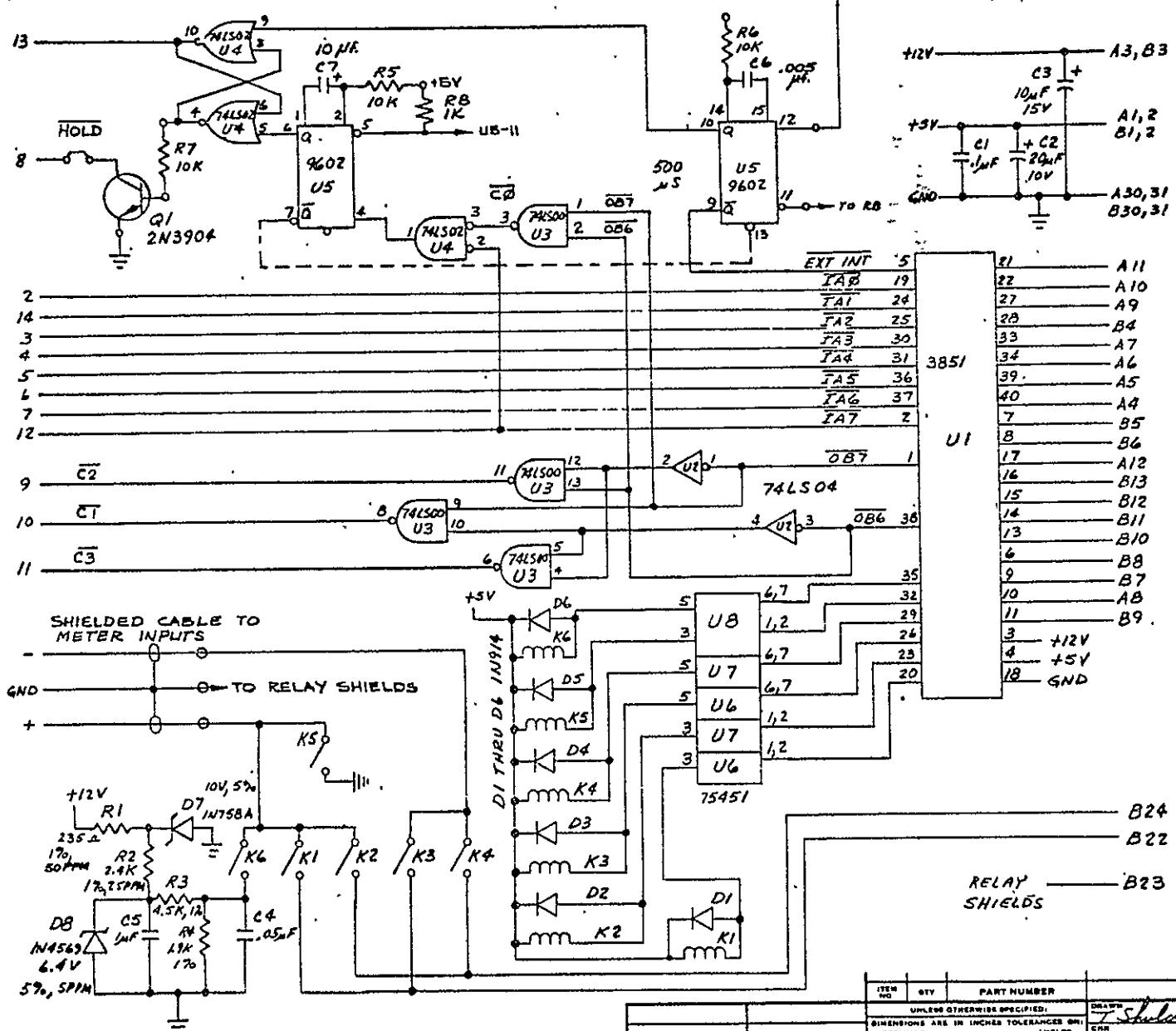
PAGE 1 OF 1

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY	CHK	MFG ENG	DATE		
97470103		-03	01	01	01	ASSY INPUT CARD 1,2						
ITEM	PART NO	REV	QTY	PCR	U	DESCRIPTION	REFERENCE DESIGNATION				CHANGE DOCUM	
				ASSM	M						REV	EN NO
001	40208465		001	EA		PCB INPUT CARD						
002	03291040		001	EA		CAP .1UF	C1					
003	03282560		001	EA		CAP 22UF 15V	C2					
004	03279100		001	EA		CAP 10UF 15V	C3					
005	26901040		008	EA		DIODE 1N914	D1 THRU D8					
006	05036350		008	EA		RELAY	K1 THRU K8					
007	26904575		002	EA		IC 94505	U2, U3					
008			001	EA		IC 3861	U1					
009			004	EA		IC 75451	U4, 5, 6, 7					
010			001	EA		CARD EJECTOR, S.A.E. 6200						
011	09917022		001	EA		SOCKET 40 PIN	U1					

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TO METER
15 PRINT

REVISIONS				
NO.	REV	DESCRIPTION	BY	DATE
1		RELEASED TO MFG PER EN		



13-32

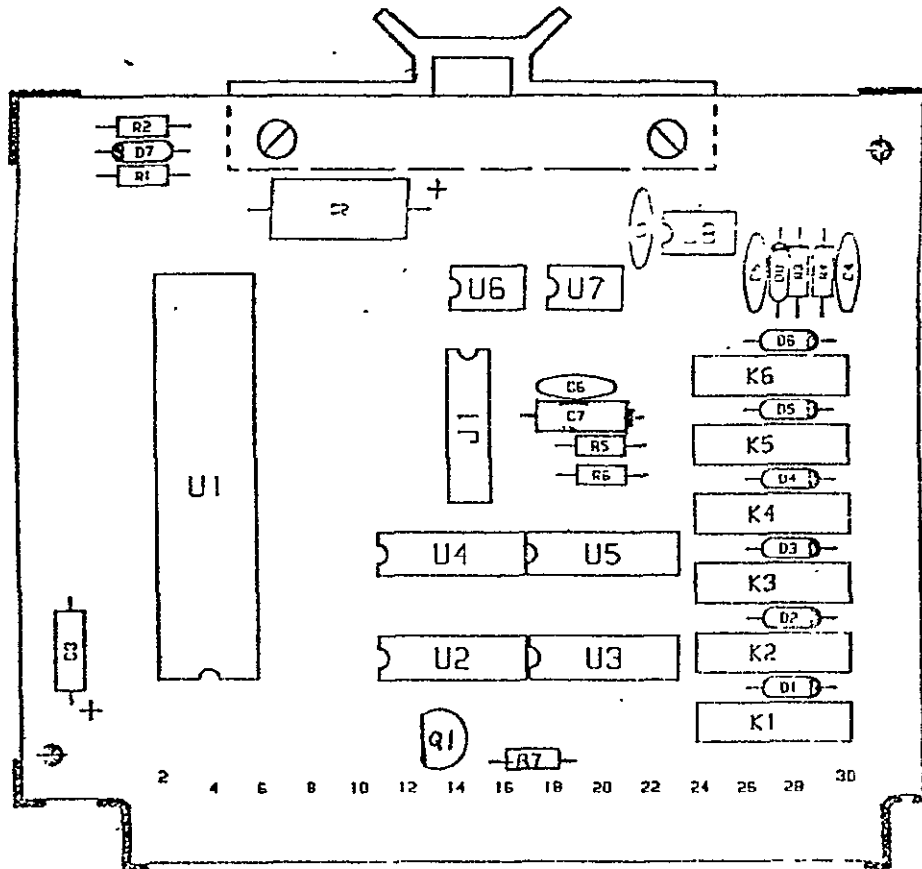
NOTE: J1 GOES TO METER (DPM READ CARD) J3.
METER INPUTS BY SEPARATE SHIELDED CABLE

ITEM NO		QTY	PART NUMBER	DESCRIPTION	
UNLESS OTHERWISE SPECIFIED:				DRAWN BY: <i>T. Shuler</i> DATE: <i>11/4/77</i>	
DIMENSIONS ARE IN INCHES TOLERANCES UNLESS OTHERWISE SPECIFIED:				FAIRCHILD INSTRUMENTATION	
DECIMALS ANGLES				DATE	
.015 .010 .005 .002 .001 .0005 .0002 .0001				TIME: <i>D.W. CORDIN</i> DATE: <i>11/4/77</i>	
BREAK SHARP EDGES 90 MAX				TITLE	
MATERIAL				SCHEMATIC-A/D CONTROL CARD	
FINISH				DATE	
TREATMENT				DATE	
CITY, ST				DATE	
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NOV - 4 1977

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



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PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048471	A/W AND SPEC	1
97470108-04	SCHEMATIC	REF
97470108	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED		DRAWN <i>T. Smith</i>		DATE 5/14/77		FAIRCHILD INSTRUMENTATION	
DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS X ± .1 XX ± .03 XXX ± .010		CHK		DATE		TITLE ASSEMBLY - A/D CONTROL CARD	
MATERIAL SEE LIST OF MAT'L		ENGR D.W. CORBIN		DATE 5/24/77			
		MFG		DATE			
		PROJ. ENGR		DATE			
NEXT ASST 82		APPVD.		SIZE A		CODE IDENT NO 97470108	
USED ON		COUNTER NO		DWG NO 97470108		REV. 1	

FAIRCHILD LIST OF MATERIAL

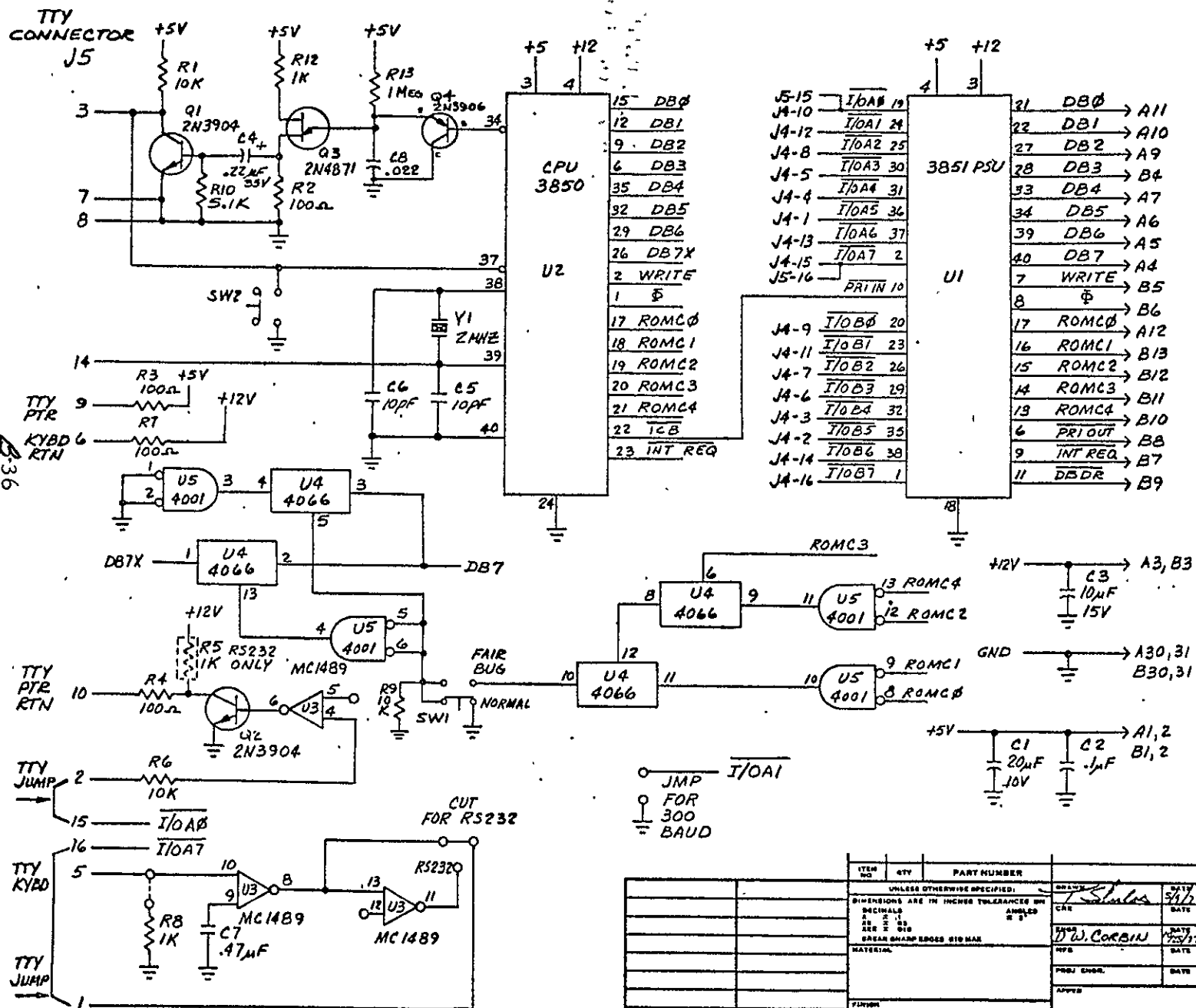
PAGE 1 OF 2

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY	CHK	MFG	ENG	DATE
97,47,01,08		-03	01	01	01	ASSY, A/D CONTROL CARD					
ITEM	PART NO	REV	QTY PER ASSM	U M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUME		DATE		
							REV	EN NO			
001	40,048,471		001	EA	P.C.B. A/D CONTROL CARD						
002	26905090		001	EA	IC 3851 PSU	U1					
003	26904564		001	EA	IC 74LS04	U2					
004	26904578		001	EA	IC 74LS00	U3					
005	26904590		001	EA	IC 74LS02	U4					
006	26905601		001	EA	IC 9602	U5					
007	26905605		003	EA	IC 75451	U6, U7, U8					
008	26901040		006	EA	DIODE 1N914	D1 THRU D6					
009	26012550		001	EA	ZENER 1N758A, 10V, 5%	D7					
010	26901016		001	EA	ZENER 1N4569, 6.4V, 5%	D8					
011	05036850		006	EA	RELAY	K1 THRU K6					
012	03291040		001	EA	CAP .1 μ F	C1					
013	03282560		001	EA	CAP 22 μ F, 15V	C2					
014	03279100		001	EA	CAP 10 μ F, 15V	C3					
015	03291850		001	EA	CAP .05 μ F	C4					
016	03170001		003	EA	CAP 1 μ F	C5, C6, C7					
017	02354850		003	EA	RES 10K, 1/4W, 5%	R5, R6, R7					
018			001	EA	RES 235 Ω , 1%, 50PPM	R1					
019			001	EA	RES 2.4K, 1%, 25PPM	R2					

PAGE 2 OF 2

[illegible]

REVISIONS				
DATE	REV	DESCRIPTION	BY	APPROVAL
	1	RELEASE TO MFG PER EN		

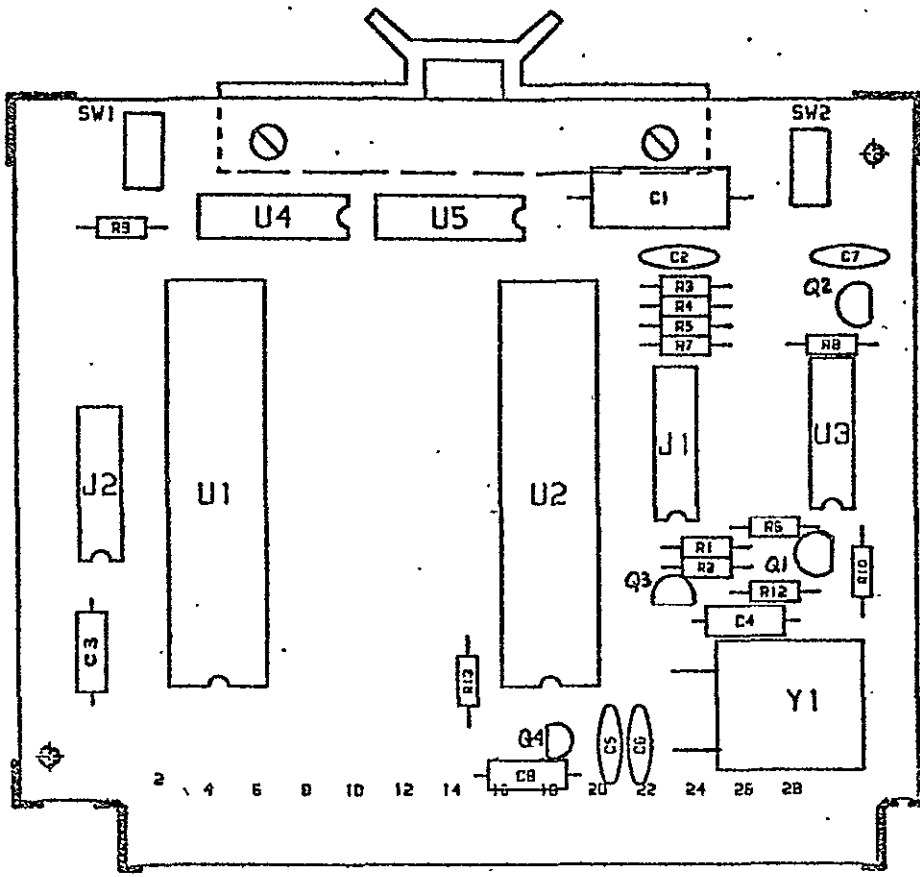


NOV - 4 1977

ITEM NO.	QTY	PART NUMBER	DESCRIPTION
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS A ± .1 B ± .05 C ± .010 D ± .015 E ± .010 F ± .010 G ± .010 H ± .010 I ± .010 J ± .010 K ± .010 L ± .010 M ± .010 N ± .010 O ± .010 P ± .010 Q ± .010 R ± .010 S ± .010 T ± .010 U ± .010 V ± .010 W ± .010 X ± .010 Y ± .010 Z ± .010			
MATERIAL			
FINISH			
TREATMENT			
APPLICATION			
DATE: 11/4/77			
C			
97470100-04			
1			
NONE			
1 OF 1			

SCHEMATIC - CPU CARD

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



ORIGINAL PAGE IS
OF POOR QUALITY

PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048472	A/W AND SPEC	1
97470100-04	SCHEMATIC	REF
97470100	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED		DRAWN <i>J. Sentes</i>		DATE 5/1/77		FAIRCHILD INSTRUMENTATION	
DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS X = .1 XX = .03 XXX = .010 BREAK SHARP EDGES .010 MAX.		CHK		DATE			
MATERIAL SEE LIST OF MAT'L		ENGR <i>D.W. CORBIN</i>		DATE 10/1/77		TITLE ASSEMBLY - CPU BOARD	
		MFG		DATE			
		PRD. ENGR		DATE			
NEXT ASSY 82		APPVD.		SIZE A		CODE IDENT NO.	
USED ON PROC DATA CONTROLLER		CONTR NO.		DVG NO. 97470100		REV. 1	

FAIRCHILD LIST OF MATERIAL

PAGE 1 OF 2

LM NO		REV	QTY	UM	DESCRIPTION		NEXT ASSY	BY	CHK	MFG ENG	DATE
97470100		-03	01	01	01	ASSY CPU BD					
ITEM	PART NO	REV	QTY PER ASSM	U	M	DESCRIPTION	REFERENCE DESIGNATION		CHANGE DOCUME		
									REV	EN	NO
001	40048472	01	001	EA		PCB CPU CARD					
002	26905090	01	001	EA		IC 3851	U1				
003	26904805	01	001	EA		IC 3850	U2				
004	26905407	01	001	EA		IC MC1489	U3				
005		01	001	EA		IC 4066	U4				
006	26904823	01	001	EA		IC 4001	U5				
007	02354380	01	004	EA		RES 100Ω 1/4W 5%	R2,3,4,7				
008	02354620	01	002	EA		RES 1KΩ 1/4W 5%	R8,12				
009	02354780	01	001	EA		RES 5.1K 1/4W 5%	R10				
010	02354850	01	003	EA		RES 10K 1/4W 5%	R1,6,9				
011	02355330	01	001	EA		RES 1MΩ 1/4W 5%	R13				
012	03175060	01	002	EA		CAP 10PF	C5,6				
013	02379120	01	001	EA		CAP .22UF 35V TANT	C4				
014	03291040	01	001	EA		CAP .1UF CERAMIC	C2				
015	03855004	01	001	EA		CAP .47UF CERAMIC	C7				
016	03279100	01	002	EA		CAP 10UF 15V TANT	C3				
017	03282560	01	001	EA		CAP 22UF 15V TANT	C1				
018	26006930	01	001	EA		DIODE FDP4600	D1				
019	26903006	01	002	EA		TRANSISTOR ZN3904	Q1,2				

PAGE 2 OF 2

③ BISHOP GRAPHICS/ACCUPRESS
REORDER NO. A-3200

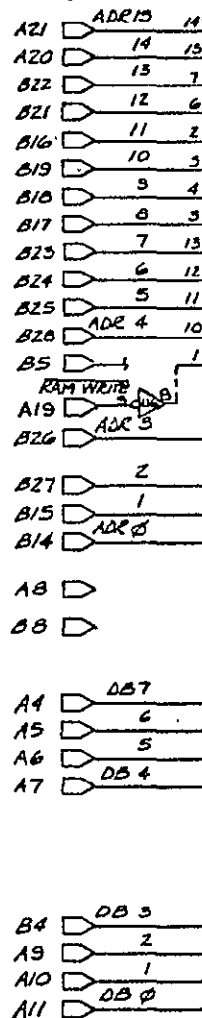
D

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ADDRESSES
 DATA — FFFA (IN HEX)
 CONTROL — FFFB "

REVISIONS				
REV	DESCRIPTION	BY	DATE	APPROVAL
1	RELEASE TO MFG PER EN			

U3

9LS133

U2

74LS138

U6

74LS04

U6

74LS04

+5

U5

F40

175

+5

U7

F40

175

+5

U1

F40

175

+5

U4

F40

175

+5

+5

16

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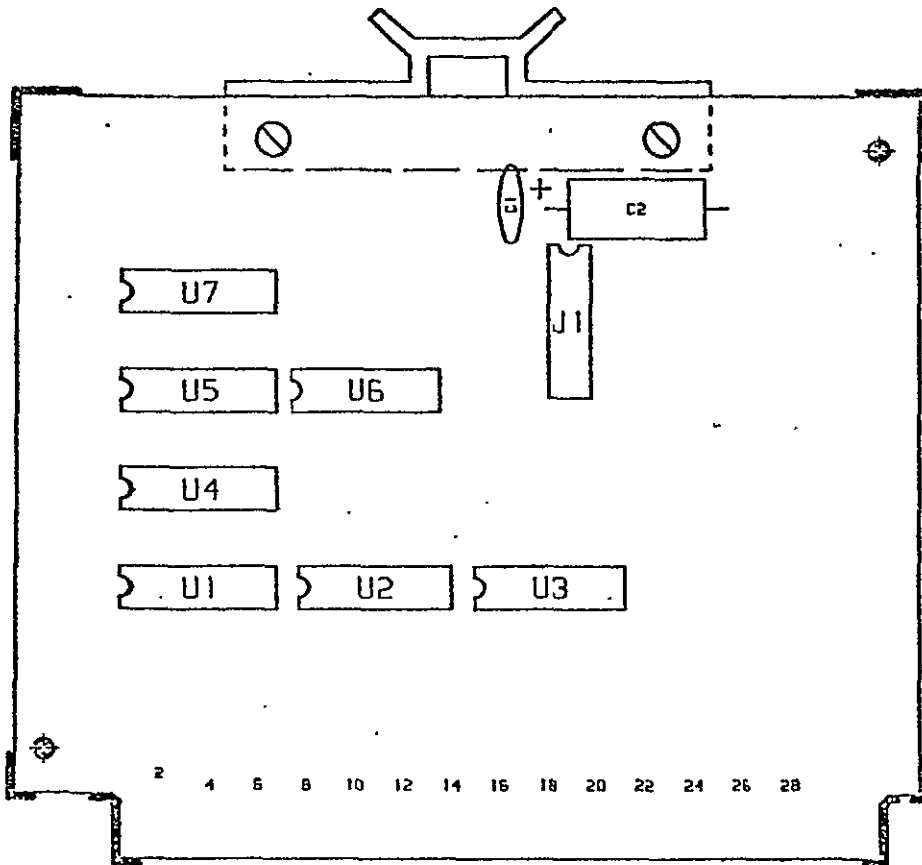
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REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG. PER EN			



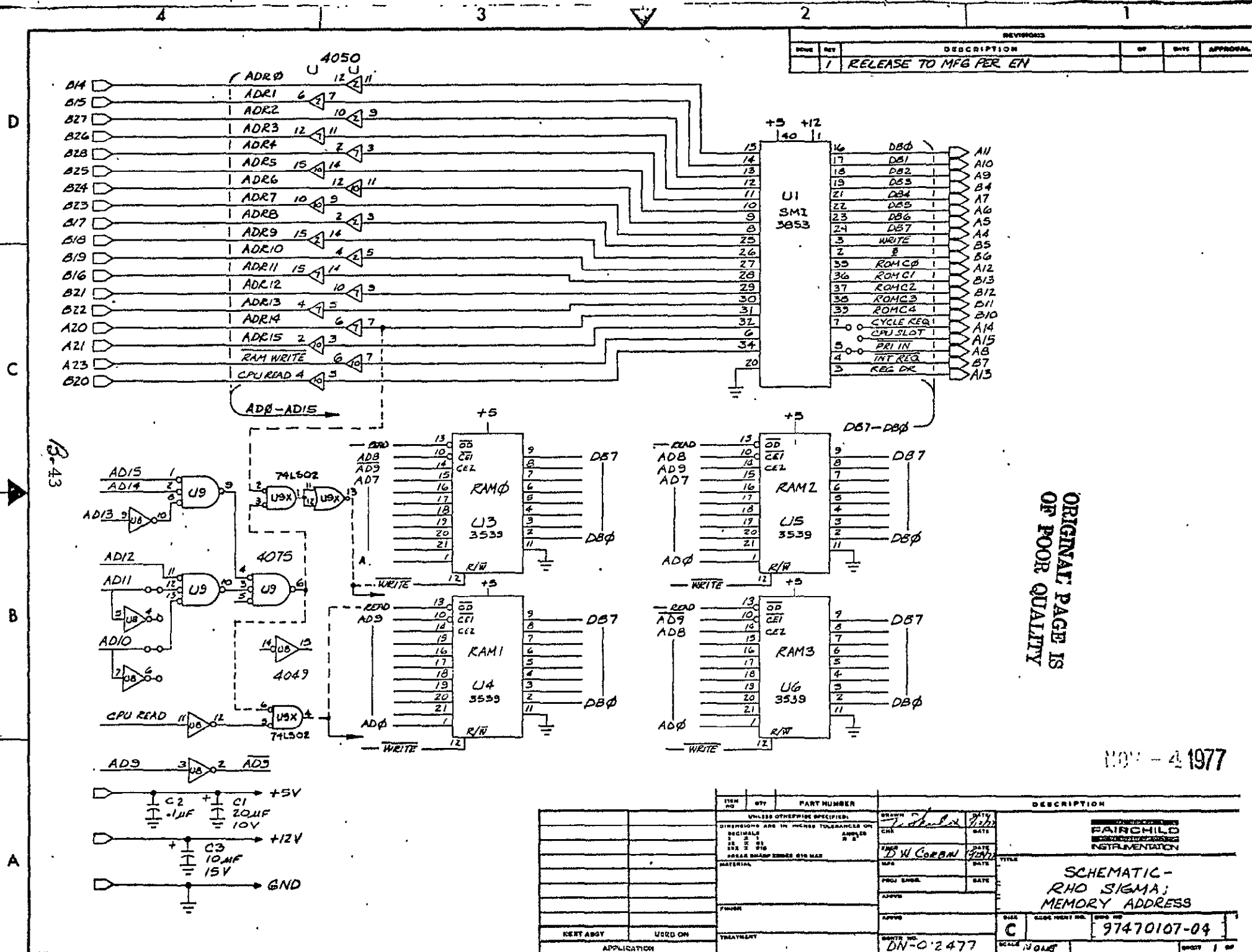
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PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV. NO.
40048467	A/W AND SPEC	1
97470105-04	SCHEMATIC	REF
97470105	LIST OF MAT'L	1

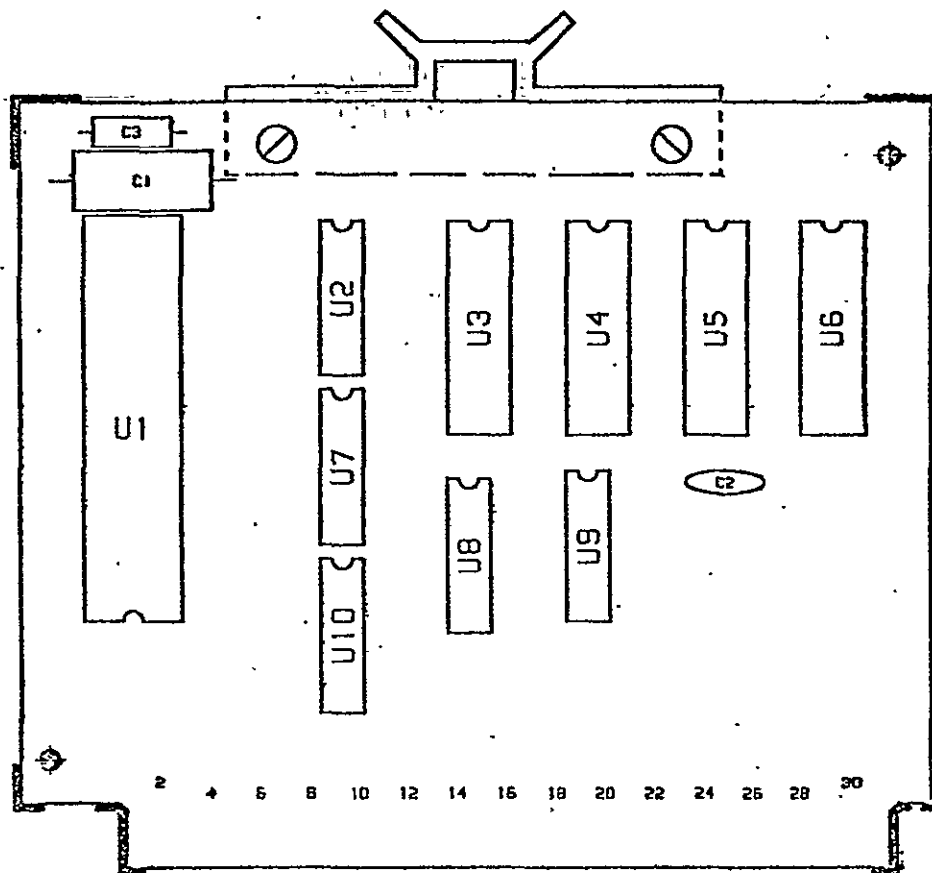
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS: .01 .03 .010 BREAK SHARP EDGES .0100 MAX. MATERIAL: SEE LIST OF MAT'L EXT ASSY: 82	DRAWN <i>T. Skidles</i> DATE 5/2/77	FAIRCHILD INSTRUMENTATION TITLE ASSEMBLY - DISPLAY DRIVER CARD	SIZE A	CODE IDENT NO 97470105	DWG NO 97470105	REV. 1
	CHK DATE					
	ENGR D.W. CORBIN DATE 10/28/70					
	PROJ. ENGR DATE					
APPVD DATE						

PAGE 1 OF 1

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REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048470	A/W AND SPEC	1
97470107-04	SCHEMATIC	REF
97470107-03	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED		DRAWN <i>T. Shuler</i>	DATE <i>8/2/77</i>
DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS X .1 XX .03 XXX .010		CHK	DATE
ANGLES ±2° BREAK SHARP EDGES .010 MAX.		ENGR <i>D.W. CORBIN</i>	DATE <i>10-28-77</i>
MATERIAL SEE LIST OF MAT'L		MFG	DATE
NEXT ASSY 82		PROJ. ENGR	DATE
USED ON PROCESS DATA CONTROLLED		APPVD.	DATE
		CONTR. NO.	

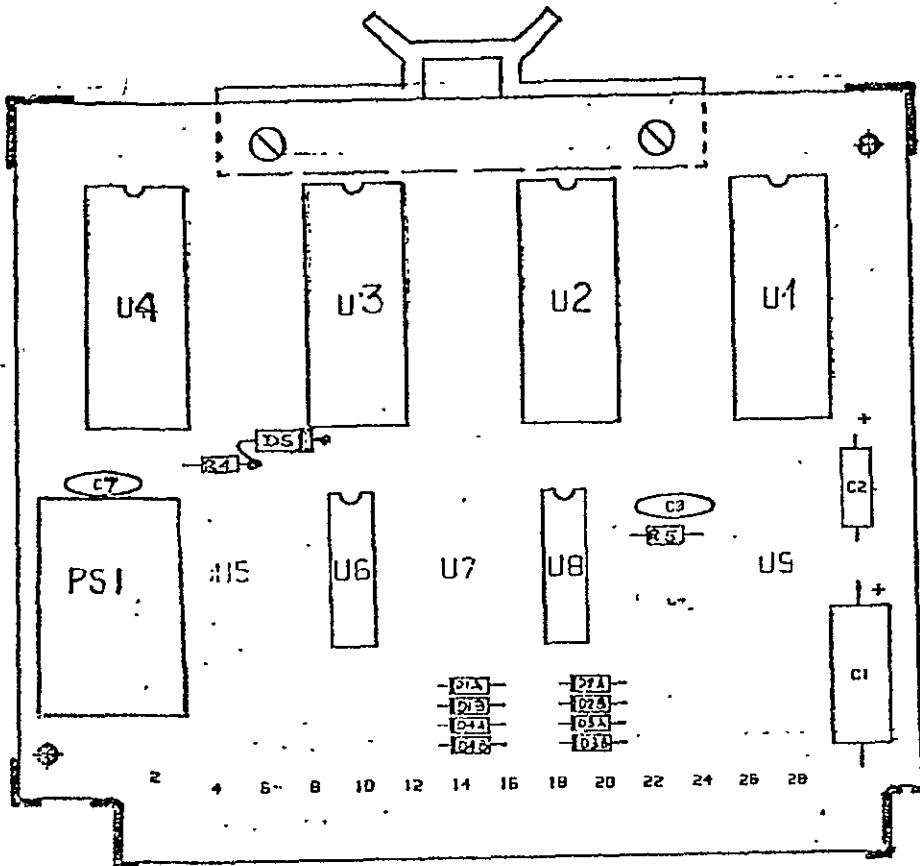
FAIRCHILD INSTRUMENTATION			
TITLE ASSEMBLY - MEMORY ADDRESS CARD			
SIZE A	CODE IDENT NO.	DWG NO. 97470107	REV 1

PAGE 1 OF 1

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REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



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PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048469	A/W AND SPEC	1
97470106-04	SCHEMATIC	REF
97470106	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED		DRAWN <i>[Signature]</i>		DATE 1/14/77		FAIRCHILD INSTRUMENTATION	
DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS XX ± .03 XXX ± .010		CHK		DATE			
BREAK SHARP EDGES .010 MAX.		ENGR D. W. CORBIN		DATE 1/25/77		TITLE ASSEMBLY - 4K EPROM CARD	
MATERIAL SEE LIST OF MAT'L		MFG		DATE			
EXT ASSY 82		PROJ. ENGR		DATE			
APPVD.		SIZE A		CODE IDENT NO 97470106		REV. 1	

FAIRCHILD LIST OF MATERIAL

PAGE 1 OF 1

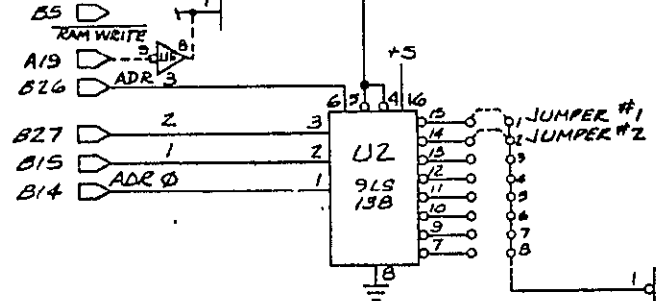
LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY	CHK	MFG ENG	DATE
97470106		-03	0.1	0.1	0.1	ASSY FROM BD				
ITEM	PART NO	REV	QTY PER ASSM	U M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT			
							REV	EN	NO	
0.01	40048469		0.01	EA	PCB FROM BD					
0.02	03291040		0.02	EA	CAP .1UF	C3, C7				
0.03	03279100		0.02	EA	CAP 10UF 15V	C2				
0.04	03282560		0.01	EA	CAP 22UF 15V	C1				
0.05	26901040		0.04	EA	DIODE 1N914	D1A, 2A, 3A, 4A OR D1B, 2B, 3B, 4B				
0.06										
0.07	02354850		0.01	EA	RES 10K, 1/4W, 5%	R5				
0.08										
0.09										
0.10			0.01	EA	RES 3.9 Ω 1/4W 5%	R4				
0.11										
0.12										
0.13										
0.14			0.01	EA	DIODE ZENER 1N5231 5V	D2				
0.15	26905022		0.04	EA	IC 2708 UV PROM	U1 THRU U4				
0.16										
0.17	26905559		0.01	EA	IC 74LS138	U6				
0.18	26904816		0.01	EA	IC 4049	U8				
0.19			0.01	EA	CARD EJECTOR, S.A.E. 6200					

REVISIONS				BY	DATE	APPROVAL
DATE	REV	DESCRIPTION				
	1	RELEASE TO MFB PER EN				

- A21 ADR15 14
- A20 14 15
- B22 13 7
- B21 12 6
- B16 11 2
- B19 10 5
- B18 9 4
- B17 8 3
- B23 7 13
- B24 6 12
- B25 5 11
- B28 ADR4 10
- B5 1

ADDRESSES
CARD #1 - FFFB
CARD #2 - FFF9

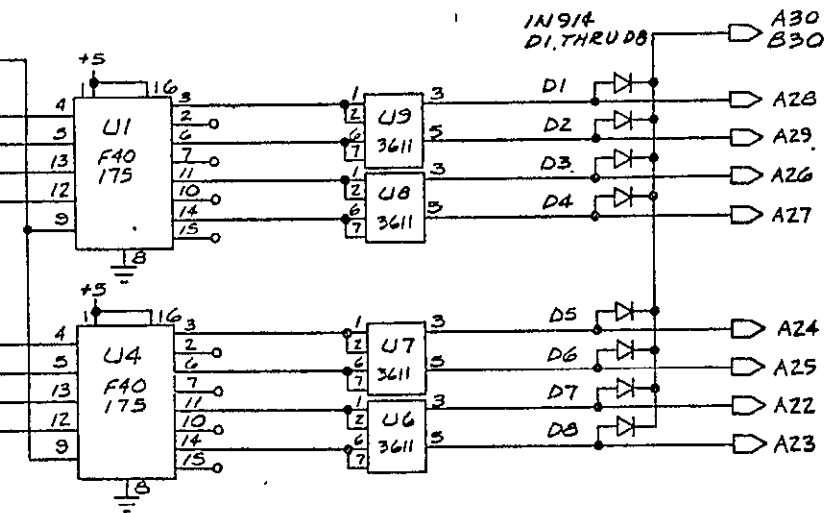
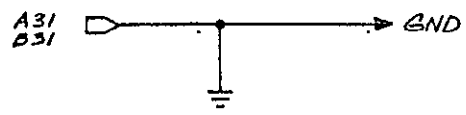
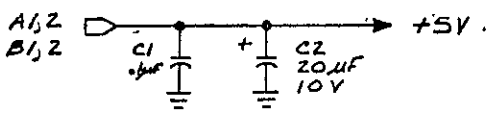
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NOTE:
OUTPUT CARD #1 - JUMPER #1
OUTPUT CARD #2 - JUMPER #2

- A4 DB7 6
- A5 5
- A6 DB4 4
- A7 3

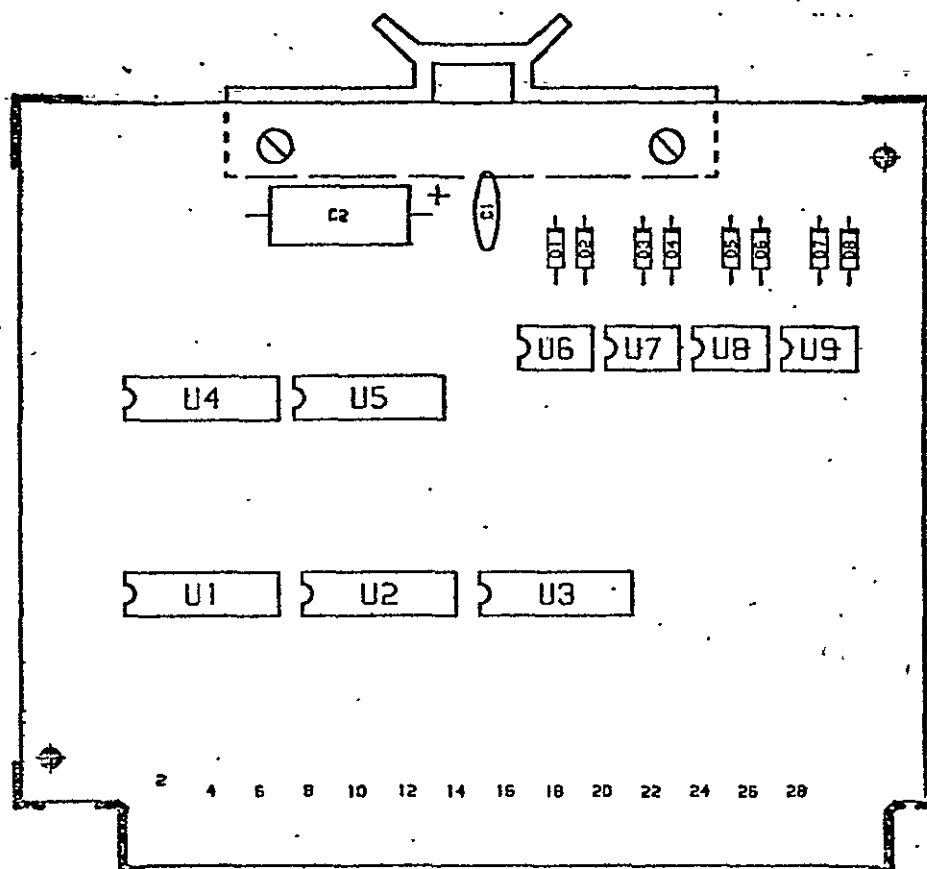
- B4 DB3 2
- A9 1
- A10 DB0 0
- A11 0



NOV 4 1977

ITEM NO	QTY	PART NUMBER	DESCRIPTION
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES ±.010 ±.005 ±.010 BREAK SHARP EDGES DIMAS <td rowspan="2"> FAIRCHILD INSTRUMENTATION </td>			FAIRCHILD INSTRUMENTATION
BRAND: <i>AD</i> DATE: <i>9/27/77</i> DESIGNED BY: <i>D.W. CORBAN</i> DATE: <i>9/27/77</i> APP'D: <i>[Signature]</i> DATE: <i>9/27/77</i> CHECKED BY: <i>[Signature]</i> DATE: <i>9/27/77</i> DRAWN BY: <i>[Signature]</i> DATE: <i>9/27/77</i> MATERIAL: <i>[Blank]</i> FINISH: <i>[Blank]</i> TREATMENT: <i>[Blank]</i> NEXT ASSY: <i>[Blank]</i> USED ON: <i>[Blank]</i> APPLICATION: <i>[Blank]</i>			
TITLE: SCHEMATIC - RHO SIGMA; OUTPUT CARD SIZE: C CODE IDENT NO: 97470104-04 LOT: 1 SCALE: <i>[Blank]</i> SHEET: 1 OF 1			

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



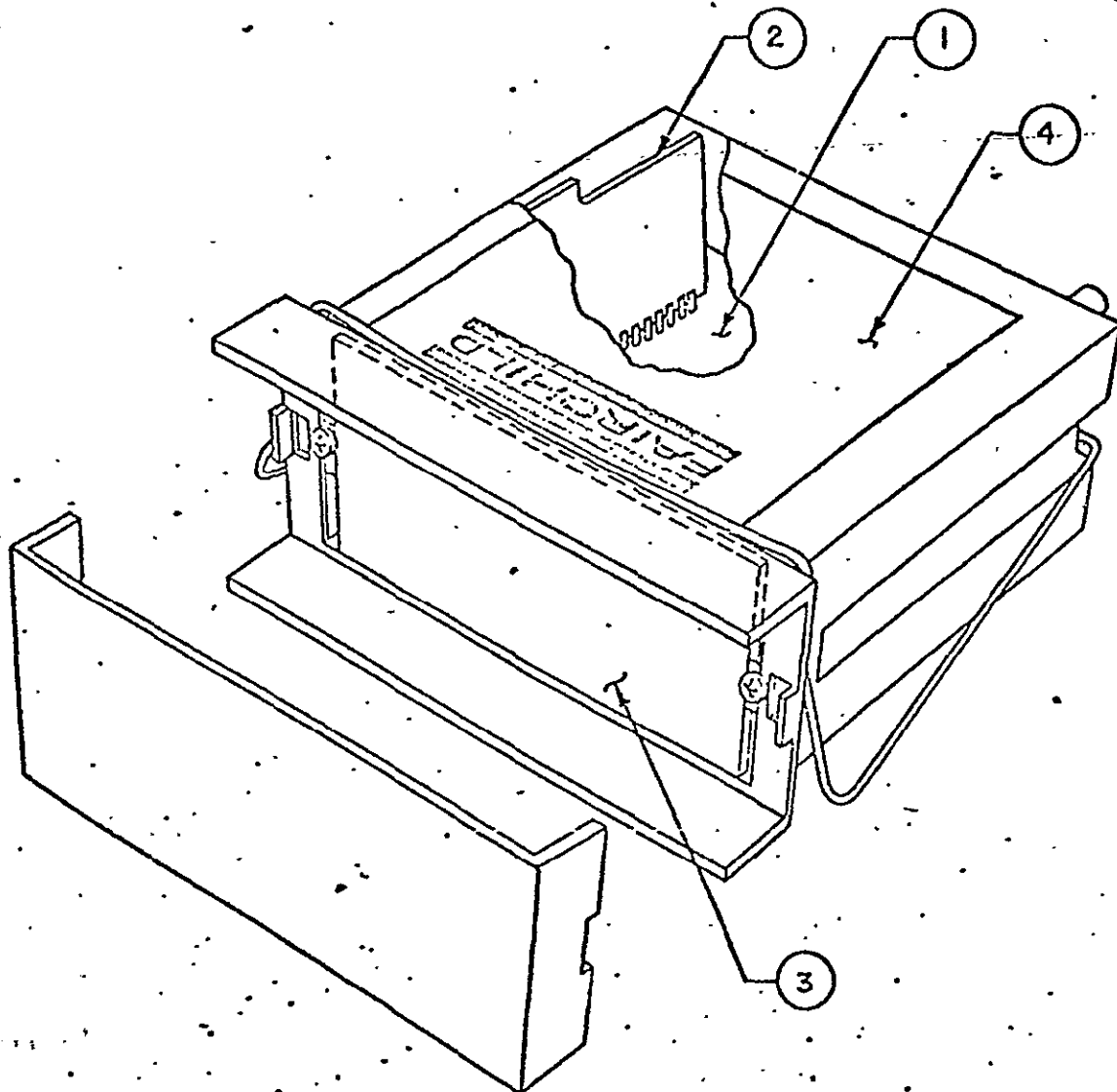
PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048466	A/W AND SPEC	1
97470104-04	SCHEMATIC	REF
97470104	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED		DRAWN <i>T. Shuster</i>	DATE <i>3/2/77</i>	FAIRCHILD INSTRUMENTATION FAIRCHILD INSTRUMENTATION		
DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS ANGLES X : .1 : 2° XX : .03 XXX : .010 BREAK SHARP EDGES .010 MAX.		CHK	DATE			
MATERIAL <i>SEE LIST OF MAT'L</i>		ENGR <i>D.W. CORBIN</i>	DATE <i>10/25/77</i>	TITLE <i>ASSEMBLY - OUTPUT CARD</i>		
		MFG	DATE			
NEXT ASSY <i>82</i>		PROJ. ENGR	DATE	SIZE <i>A</i>		
		APPVD.				CODE IDENT NO. <i>97470104</i>
USED ON <i>PROGRAM CONTROLLER</i>		CONTR NO. <i>DAI-012477</i>		SCALE <i>1/1</i>	SHEET <i>1</i>	OF <i>1</i>

PAGE 1 OF 1

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REV.	DESCRIPTION	BY	DATE	APPROVED
3	REVISED AND REDRAWN PER EN6464	T.S.		D.P. 11-3-77



PRINCIPLE DRAWING TABLE

DRAWING NO.	DESCRIPTION	REV.
82540520-03	LIST OF MAT'L	3
97401119-04	SCHEMATIC AC 4 1/2	REF

UNIT CONFIGURATION TABLE

PART NO.	DESCRIPTION	REV.
97400312	ASSY BASE BD	1
97400309	ASSY ANALOG BD (2V)	1
97400402	ASSY DISPLAY BD 4 1/2	1
97401055		1

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES. TOLERANCES ON
DECIMALS
X .01
XX .03
XXX .010
ANGLES
22°
BREAK SHARP EDGES DIC MAX

MATERIAL

NEXT ASSY

USED ON DPM

DRAWN

CHK

ENGR

PROJ. ENGR

APPVD.

CONTR. NO.

DATE

DATE

DATE

DATE

DATE

FAIRCHILD
SYSTEMS TECHNOLOGY

TITLE

4 1/2 AC DPM ASSY
CONN (2V)

SIZE
A

CODE IDENT NO
25677

DWG NO

82540520

REV

3

SCALE NONE

SHEET 1 OF 1

PAGE 1 OF 1

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY	CHK	MFG ENG	DATE
8,254,052,0		-03	03	0,1	3,1	4 1/2 AC DPM ASSY CONN(2V)				
ITEM	PART NO	REV	QTY PER ASSY	U	M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT		
001	97400312	03	001	EA	ASSY BASE BD CONN	N/A		03	646	
002	97400309	03	001	EA	ASSY ANALOG BD(2V)	N/A				
003	97400402	03	001	EA	ASSY DISPLAY BD 4 1/2	N/A				
004	97401055	03	001	EA	ACCESSORY KIT 4 1/2 CONN	N/A				
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REV	DESCRIPTION	BY	DATE
1	RELEASE TO MFG PER EN 6469	4C	11/1/64
2	REVISED PER EN 6506	4C	11/1/64
3	REVISED PER EN 6481	4C	11/1/64

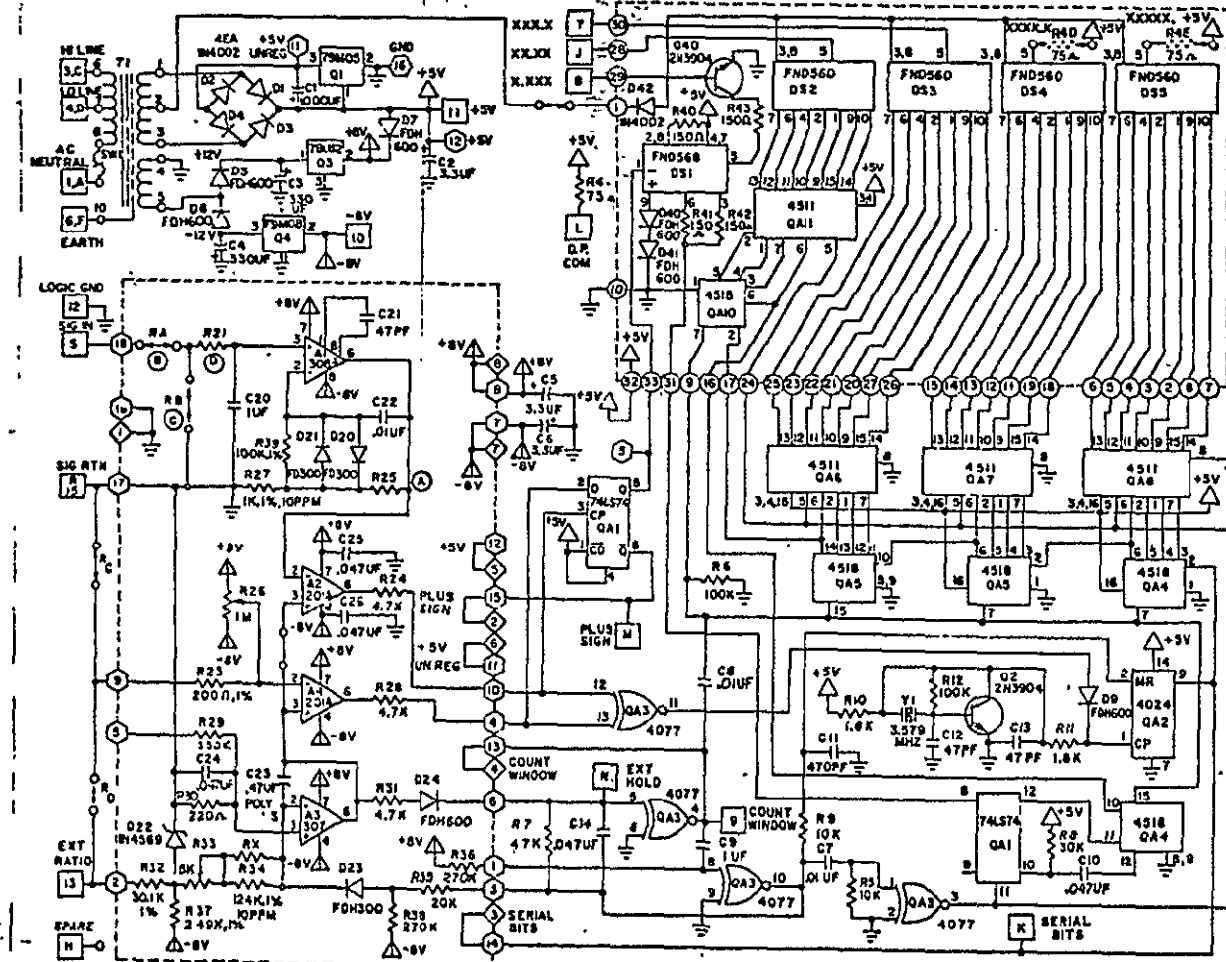


TABLE I

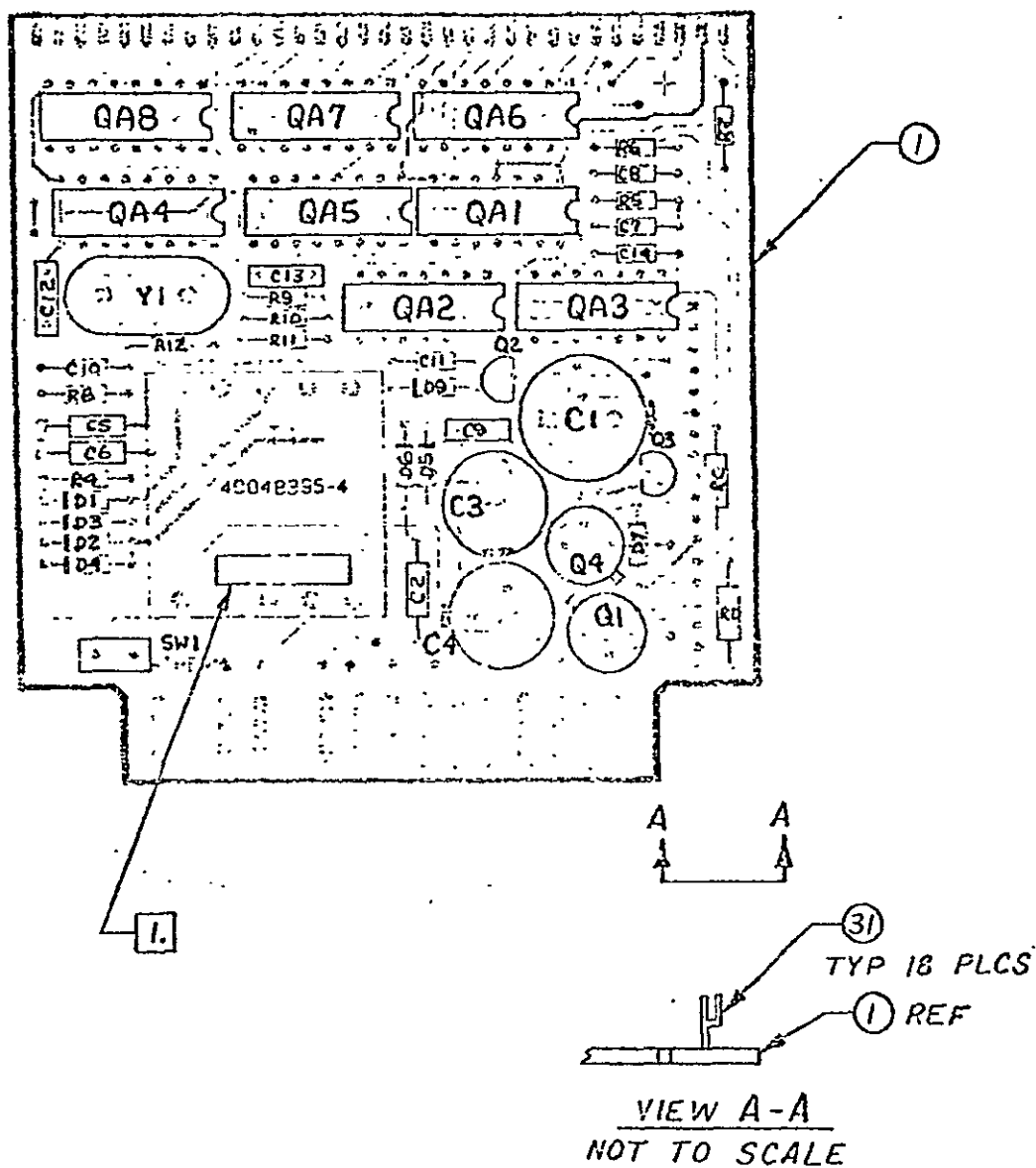
	4 1/2 (2V)	4 1/2 (20V)	4 1/2 (200V)
A R25	1.5K, 1/4 W 1%, 10 PPM	23.7K, 1/4 W 1%, 10 PPM	1.5K, 1/4 W 1%, 10 PPM
B RA	JUMPED	10 MEG 50 PPM	10 MEG 50 PPM
C RB	OPEN	100 K 10 PPM	100 K 10 PPM
D R21	100K, 1/4 W 1%, 100 PPM	JUMPED	JUMPED

2. ALL RESISTORS ARE .25W, 5%.

1. USAGE AND VALUE TO BE DETERMINED AT TEST.

NOTES: UNLESS OTHERWISE SPECIFIED

REV	DATE	DESCRIPTION
1	11/1/64	SCHEMATIC DPM 4 1/2 AC
2	11/1/64	97401119-0



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BASE BD. ASS'Y

PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV
4004B395	ALY & SPEC	4
9740C312-03	LIST OF MAT'L	1

FAIRCHILD LIST OF MATERIAL

PAGE 1 OF 2

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY	CHK	MFG ENG	DATE
740,03,12		-03	0.2	0.1	0.1	AC BASE BD ASSY VA/VE CONN				
ITEM	PART NO	REV	QTY PER ASSM	U M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT			
							REV	EN	NO	
01	40048395	01	001	EA	PCB BASE BOARD CONN	N/A				
02	26904584	01	001	EA	IC 74LS74	QA1	02			6501
03	26904824	01	001	EA	IC 4077	QA3				
04	26904815	01	001	EA	IC 4024 CMOS	QA2				
05	26904817	01	002	EA	IC 4518 CMOS	QA4, QA5				
06	26904820	01	003	EA	IC 4511 CMOS	QA6, QA7, QA8				
07	26902004	01	004	EA	DIODE 1N4002	D1 THRU D4				
08	26906930	01	004	EA	DIODE FDH600	D7, D9, D5, D6				
09	26905200	01	001	EA	TRANSISTOR 79M08	Q1				
10	26905810	01	001	EA	TRANSISTOR 79M05	Q1				
11	26903006	01	001	EA	TRANSISTOR 2N3904	Q2				
12	27903007	01	001	EA	XTAL 3.579MHZ	Y1				
13	03924003	02	002	EA	CAP .01UF	C7, C8				
14	03283530	01	003	EA	CAP 3.3UF, 15V, 10%	C2, C5, C6				
15	03980001	01	001	EA	CAP 1000UF 16V ELE	C1				
16	03980002	01	002	EA	CAP 330UF	C3, C4				
17	03291060	01	001	EA	CAP 1UF, 50V, 20%	C9				
18	03024003	02	001	EA	CAP 470PF	C11				
19	03175190	01	005	EA	CAP 47PF	C12, C13				
20	03924007	01	002	EA	CAP .047UF	C14, C10				
21	10095400	01	001	EA	THERMAL SW	SW1				

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PAGE 2 OF 2

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CORDER NO. A 5202

FAIRCHILD LIST OF MATERIAL

PAGE 1 OF 2

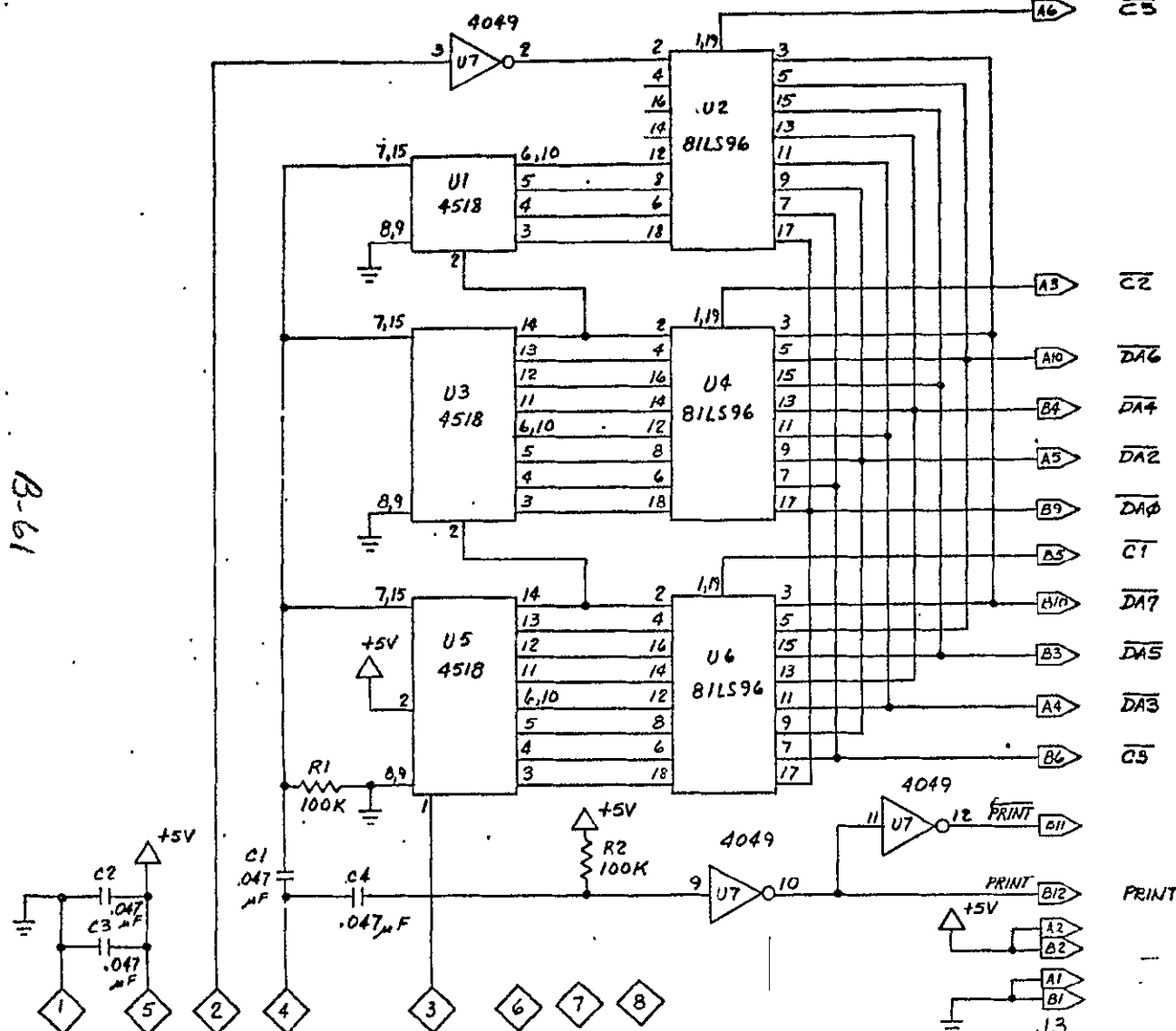
LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY <u>T. Shuler</u>	CHK <u>D. 88</u>	MFG ENG	DATE
1400309		-03	02	01	01	ANALOG ASSY 4 1/2 (2V)	DATE <u>12/10/76</u>	DATE	ENGR	DATE
EM	PART NO	REV	QTY PER ASSM	U M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT			
							REV	EN NO		
01	40048396	01	001	EA	PCB ANALOG BD	N/A	0.1	646		
02	26905332	01	001	EA	OP AMP 308A	A1	0.2	650		
03	26905326	01	002	EA	OP AMP 201A	A2, A4				
04	26905327	01	001	EA	OP AMP 307	A3				
05	26012320	01	003	EA	DIODE FD 300	D23, D21, D20				
06	26006930	01	001	EA	DIODE FDH600	D24				
07	26901016	01	001	EA	DIODE 1N4569	D22				
08	03870001	01	001	EA	CAP 1UF 100V 10%	C20				
09	03932004	01	001	EA	CAP .47UF POLY S	C23				
10	03175190	01	001	EA	CAP 47PF	C21				
11	03924007	01	004	EA	CAP .047UF	C25, C26, C24, C22				
12	02909002	01	002	EA	RES 100K, 1/4W, 1%, 100PPM	R21, R39				
13	02354460	01	001	EA	RES 220Ω, 1/4W, 5%	R30				
14	02936022	01	001	EA	RES 124K, 1/4W, 1%, 10PPM	R34				
15	02354920	01	001	EA	RES 20K, 1/4W, 5%	R35				
16	02372290	01	001	EA	RES 200Ω, 1/4W, 1%	R23				
17	02354770	01	003	EA	RES 4.7K, 1/4W, 5%	R28, R24, R31				
18	02936011	01	001	EA	RES 1K, 1/4W, 1%, 10PPM	R27				
19	02373340	01	001	EA	RES 2.49K, 1/4W, 1%	R37				
20	02936013	01	001	EA	RES 1.5K, 1/4W, 1%, 10PPM	R25				
21	02355190	01	002	EA	RES 270K, 1/4W, 5%	R38, R36				

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PAGE 2 OF 2

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NOTE. J3 CONNECTS TO A/D CONTROL CARD "J1"

ITEM NO.		QTY	PART NUMBER	DESCRIPTION	
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES UNLESS SHOWN OTHERWISE: FRACTIONS DECIMALS 1/16 1/32 1/64 1/8 1/4 3/8 1/2 5/8 3/4 7/8 1 1 1/4 1 1/2 1 3/4 2 2 1/4 2 1/2 3 3 1/4 3 1/2 4 4 1/4 4 1/2 5 5 1/4 5 1/2 6 6 1/4 6 1/2 7 7 1/4 7 1/2 8 8 1/4 8 1/2 9 9 1/4 9 1/2 10 10 1/4 10 1/2 11 11 1/4 11 1/2 12 12 1/4 12 1/2 13 13 1/4 13 1/2 14 14 1/4 14 1/2 15 15 1/4 15 1/2 16 16 1/4 16 1/2 17 17 1/4 17 1/2 18 18 1/4 18 1/2 19 19 1/4 19 1/2 20 20 1/4 20 1/2 21 21 1/4 21 1/2 22 22 1/4 22 1/2 23 23 1/4 23 1/2 24 24 1/4 24 1/2 25 25 1/4 25 1/2 26 26 1/4 26 1/2 27 27 1/4 27 1/2 28 28 1/4 28 1/2 29 29 1/4 29 1/2 30 30 1/4 30 1/2 31 31 1/4 31 1/2 32 32 1/4 32 1/2 33 33 1/4 33 1/2 34 34 1/4 34 1/2 35 35 1/4 35 1/2 36 36 1/4 36 1/2 37 37 1/4 37 1/2 38 38 1/4 38 1/2 39 39 1/4 39 1/2 40 40 1/4 40 1/2 41 41 1/4 41 1/2 42 42 1/4 42 1/2 43 43 1/4 43 1/2 44 44 1/4 44 1/2 45 45 1/4 45 1/2 46 46 1/4 46 1/2 47 47 1/4 47 1/2 48 48 1/4 48 1/2 49 49 1/4 49 1/2 50 50 1/4 50 1/2 51 51 1/4 51 1/2 52 52 1/4 52 1/2 53 53 1/4 53 1/2 54 54 1/4 54 1/2 55 55 1/4 55 1/2 56 56 1/4 56 1/2 57 57 1/4 57 1/2 58 58 1/4 58 1/2 59 59 1/4 59 1/2 60 60 1/4 60 1/2 61 61 1/4 61 1/2 62 62 1/4 62 1/2 63 63 1/4 63 1/2 64 64 1/4 64 1/2 65 65 1/4 65 1/2 66 66 1/4 66 1/2 67 67 1/4 67 1/2 68 68 1/4 68 1/2 69 69 1/4 69 1/2 70 70 1/4 70 1/2 71 71 1/4 71 1/2 72 72 1/4 72 1/2 73 73 1/4 73 1/2 74 74 1/4 74 1/2 75 75 1/4 75 1/2 76 76 1/4 76 1/2 77 77 1/4 77 1/2 78 78 1/4 78 1/2 79 79 1/4 79 1/2 80 80 1/4 80 1/2 81 81 1/4 81 1/2 82 82 1/4 82 1/2 83 83 1/4 83 1/2 84 84 1/4 84 1/2 85 85 1/4 85 1/2 86 86 1/4 86 1/2 87 87 1/4 87 1/2 88 88 1/4 88 1/2 89 89 1/4 89 1/2 90 90 1/4 90 1/2 91 91 1/4 91 1/2 92 92 1/4 92 1/2 93 93 1/4 93 1/2 94 94 1/4 94 1/2 95 95 1/4 95 1/2 96 96 1/4 96 1/2 97 97 1/4 97 1/2 98 98 1/4 98 1/2 99 99 1/4 99 1/2 100 100 1/4 100 1/2				DATE 11/1/77 BY J. Shuman TITLE SCHEMATIC - DPM READ CARD SIZE C SCALE NONE SHEET 1 OF 1	

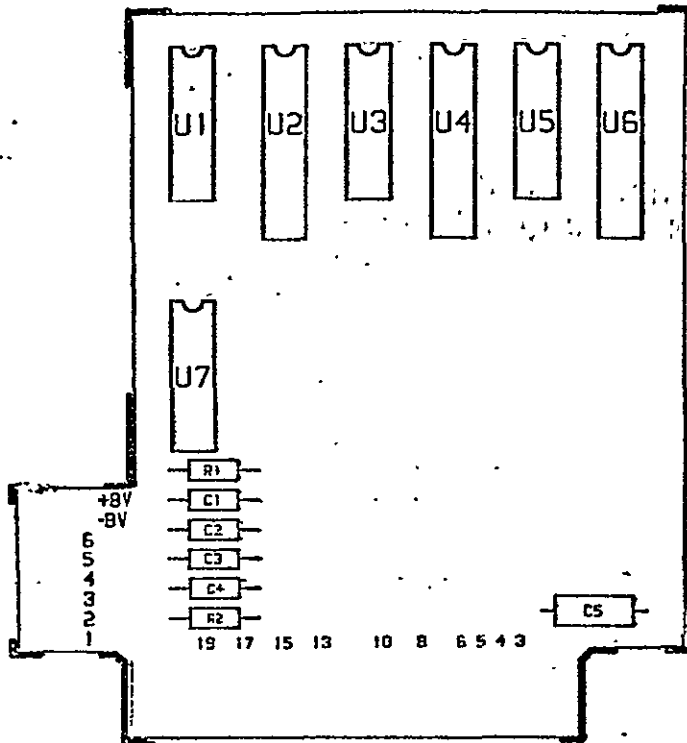
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REVISIONS			BY	DATE	APPROVAL
1	RELEASED TO MFG PER EN				

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVED
8	RELEASED TO MFG PER EN			



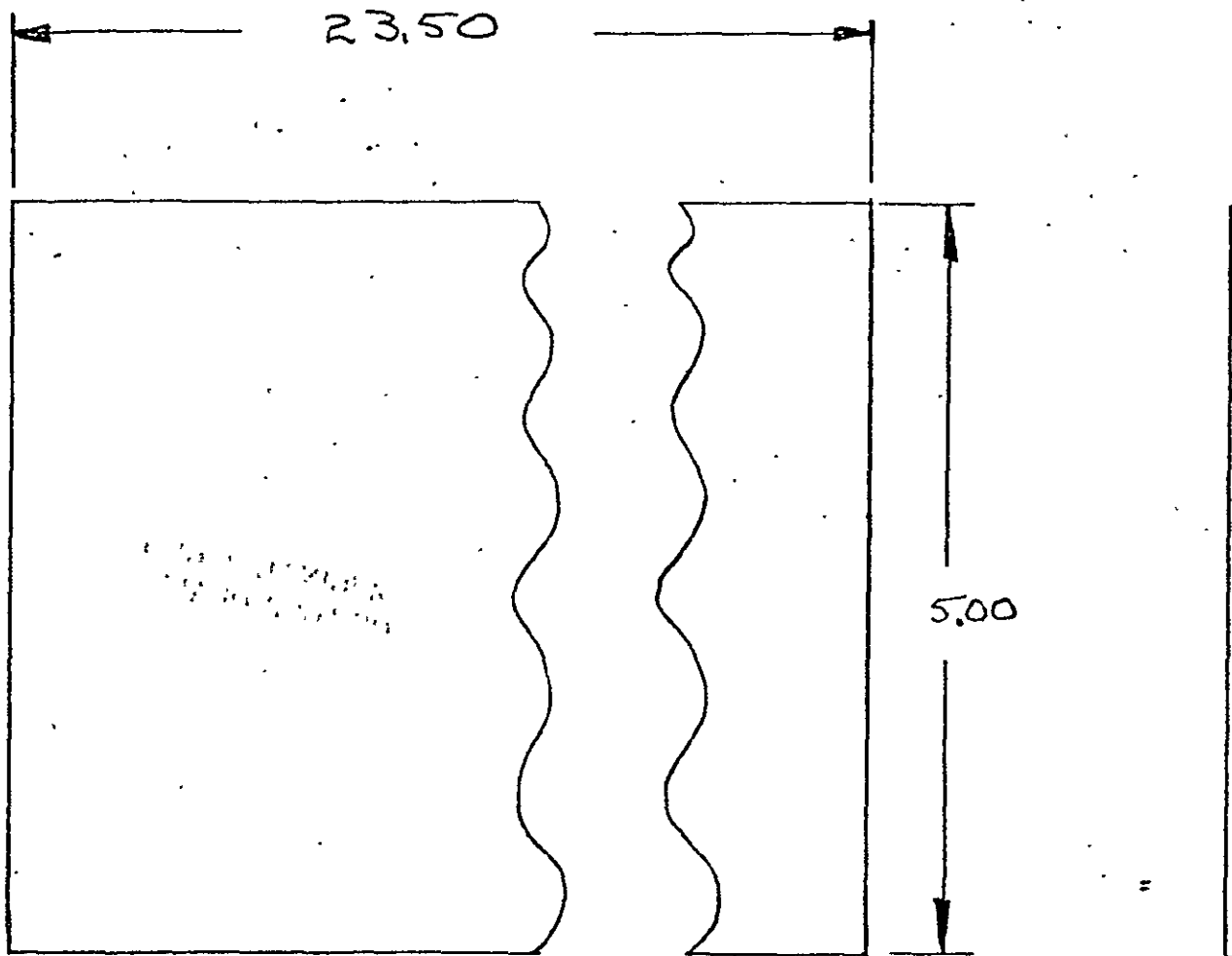
PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048486	A/W AND SPEC	1
97470109-04	SCHEMATIC	REF
97470109	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED		DRAWN <i>T. Shuler</i> CHK DATE 5/12/77	FAIRCHILD INSTRUMENTATION	
DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS .01 ANGLES $\pm 2^\circ$ XX $\pm .03$ XXX $\pm .010$ BREAK SHARP EDGES .010 MAX.		ENCR <i>D.W. CORBIN</i> HFC DATE 10-28-77	TITLE ASSEMBLY— DPM READ BOARD	
MATERIAL		PROJ. ENCR DATE		
NEXT ASSY		APPVD. DATE	SIZE A	CODE IDENT NO. 97470109
SEE LIST OF MAT'L 82		DWG NO. 97470109	REV. 1	

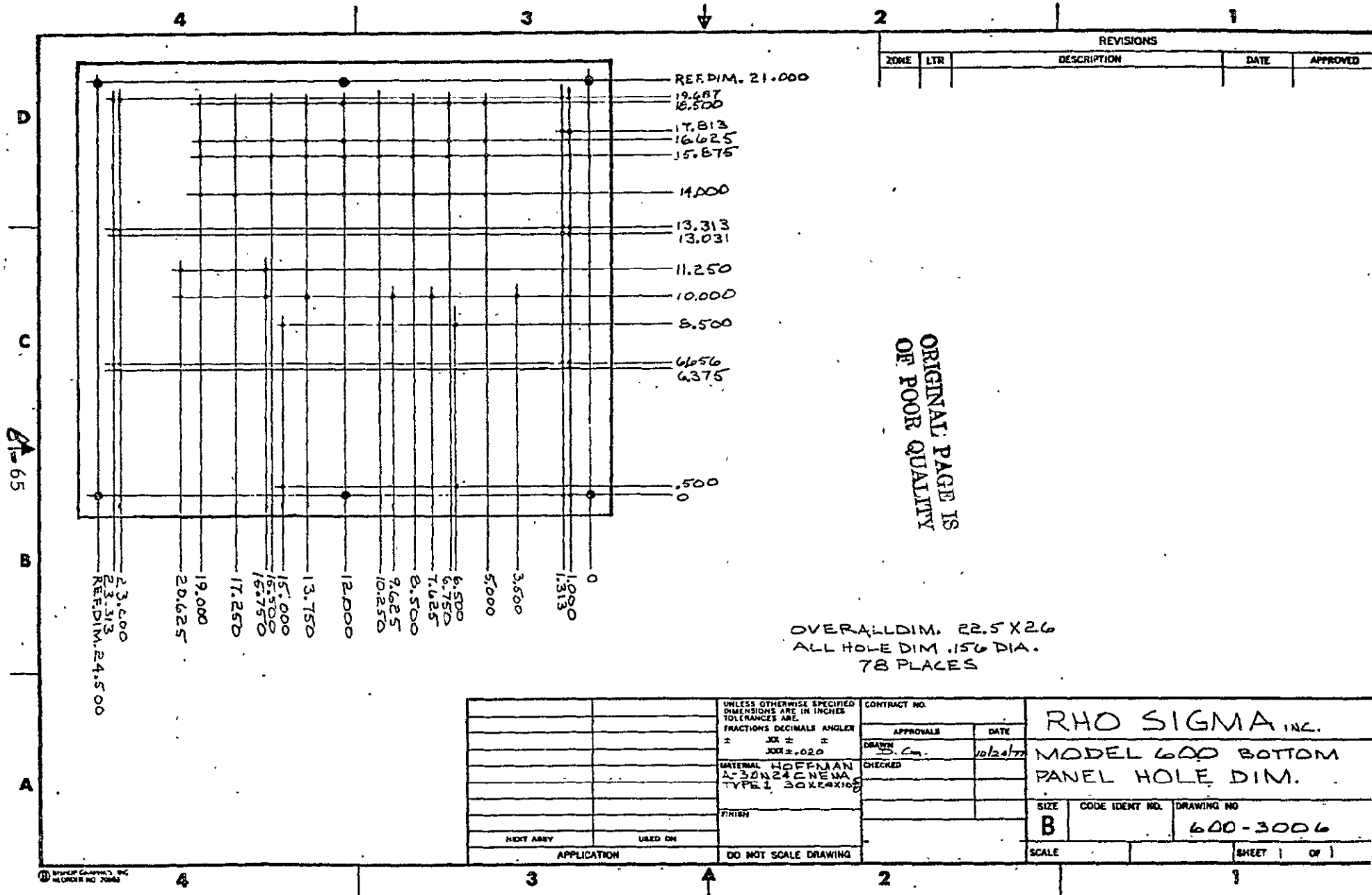
PAGE 1 OF 1

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APPLICATION			REVISION		
NEXT ASSY	USED ON	LTR	DESCRIPTION	DATE	APPROVED



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES $\pm .XX \pm$ $.XXX \pm$	CONTRACT NO.		RHO SIGMA INC		
	APPROVALS	DATE			
	DRAWN <i>D.G.</i>		RS 600 BRACKET DIM		
	CHECKED				
MATERIAL ALUM. 18 GAGE			SIZE A	CODE IDENT NO.	DRAWING NO. 600-3001
FINISH NONE	B-64				
DO NOT SCALE DRAWING			SCALE FULL	SHEET 1	OF 1

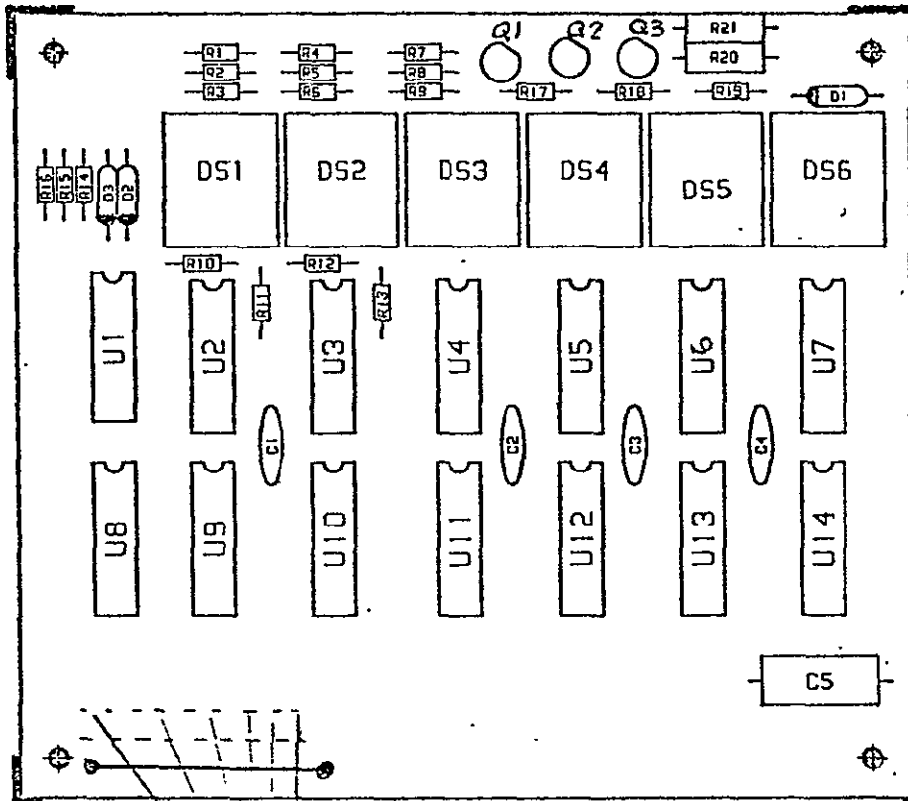


ITEM NO		STV	PART NUMBER		DESCRIPTION					
UNLESS OTHERWISE SPECIFIED:					SEARCHED	SERIALIZED	<div>FAIRCHILD INSTRUMENTATION</div> <div>SCHEMATIC - DISPLAY CARD</div>			
DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS					CNC	DATE				
0 ± .1					ENGR	DATE				
.02 ± .03					D.W. CORBIN	DATE				
0.12 ± .010					NFO	DATE	TITLE			
AREAS SHARP EDGES AND MAX.					FORD ENCL.	DATE				
MATERIAL					AFFYS					
FINISH					AFFYS					
TREATMENT					QTY		SIZE	ORIG IDENT NO.	REV NO	REV
DRAWING NO.					DN-01Z+77		C		97470111-04	1
					SCALE		NONE	SHEET 1 OF 1		

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			

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PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048491	A/W AND SPEC	1
97470111-04	SCHEMATIC	REF
97470111	LIST OF MAT'L	1

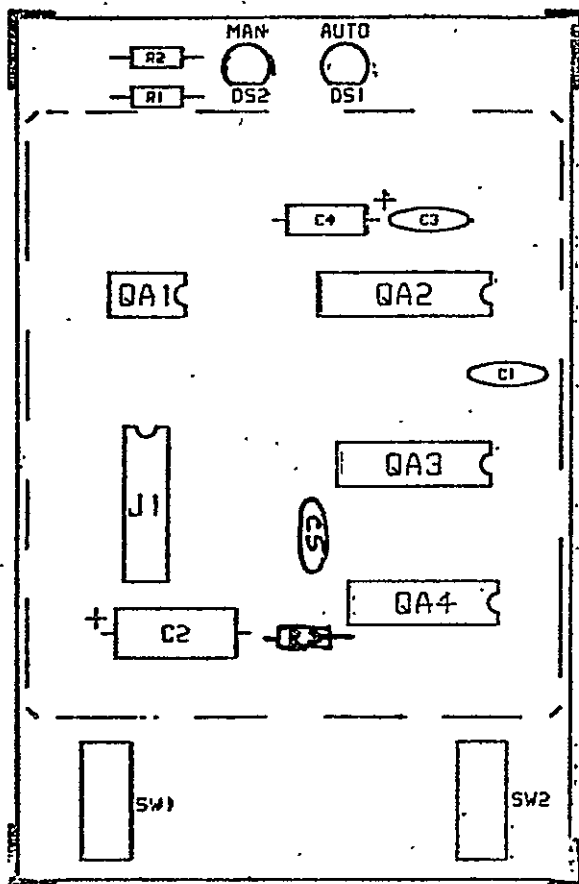
<p>UNLESS OTHERWISE SPECIFIED</p> <p>DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS</p> <p>XX ± .03</p> <p>XXX ± .010</p> <p>BREAK SHARP EDGES .010 MAX.</p> <p>MATERIAL</p> <p>SEE LIST OF MAT'L</p> <p>NEXT ASSY</p> <p>82</p>	<p>DRAWN</p> <p>T. Shindle</p> <p>CHK</p> <p>ENGR</p> <p>D.W. CORBIN</p> <p>MFG</p> <p>PROJ. ENGR</p> <p>APPVD.</p>	<p>DATE</p> <p>DATE</p> <p>DATE</p> <p>DATE</p> <p>DATE</p>	<p>FAIRCHILD</p> <p>INSTRUMENTATION</p> <p>TITLE</p> <p>ASSEMBLY -</p> <p>DISPLAY CARD</p>	<p>SIZE</p> <p>A</p> <p>CODE IDENT NO.</p> <p>DWG NO</p> <p>97470111</p> <p>REV.</p> <p>1</p>

FAIRCHILD LIST OF MATERIAL

PAGE 1 OF 1

LM NO	REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY <u>SC</u>	CHK	MFG ENG	DATE
97A70111	-03	01	01	01	DISPLAY CARD	DATE <u>5/77</u>	DATE	ENGR	DATE
ITEM	PART NO	REV	QTY PER ASSM	U M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT		
							REV	EN NO	
001	40048491	01	001	EA	PCB DISPLAY CARD				
002	03291040	01	004	EA	CAP .1MF CERAMIC	C1,2,3,4			
003	03282560	01	001	EA	CAP 22MF 15V TANT	C5			
004		01	001	EA	DIODE 1N4002	D1			
005	26901040	01	002	EA	DIODE 1N914	D2,3			
006		01	002	EA	RES 9.1Ω 1/2W 1%	R20,21			
007	02354140	01	003	EA	RES 10Ω 1/4W 5%	R17,18,19			
008	02354400	01	006	EA	RES 120Ω 1/4W 5%	R1,2,3,10,11,12			
009	02354420	01	007	EA	RES 150Ω 1/4W 5%	R4,5,6,7,8,9,13			
010		01	006	EA	IC 4042	U9,10,11,12,13,14			
011	26904820	01	004	EA	IC 4511	U4,5,6,7			
012		01	001	EA	IC 9667	U2			
013		01	001	EA	IC 74LS42	U8			
014	26904594	01	001	EA	IC 7414	U1			
015		01	001	EA	IC 82S23 OR EQUIVALENT	U3 - PROM CODE #6177 -			
016	26905223	01	004	EA	LED FND560	DS3,4,5,6			
017	26905224	01	001	EA	LED FND567	DS2			
018	26905225	01	001	EA	LED FND568	DS1			
019	26903502	01	003	EA	TRANSISTOR 2N3906	Q1,2,3			
020		01	004	EA	SWITCH TOGGLE	SW1,2,3,4			
021		01	001	EA	CARD EJECTOR, S.A.E. 6200				

REV.	DESCRIPTION	BY	DATE	APPROV.
1	REL TO MFG PER EN			



PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048507	A/W AND SPEC	1
97470112-04	SCHEMATIC	REF
97470112-03	LIST OF MAT'L	1

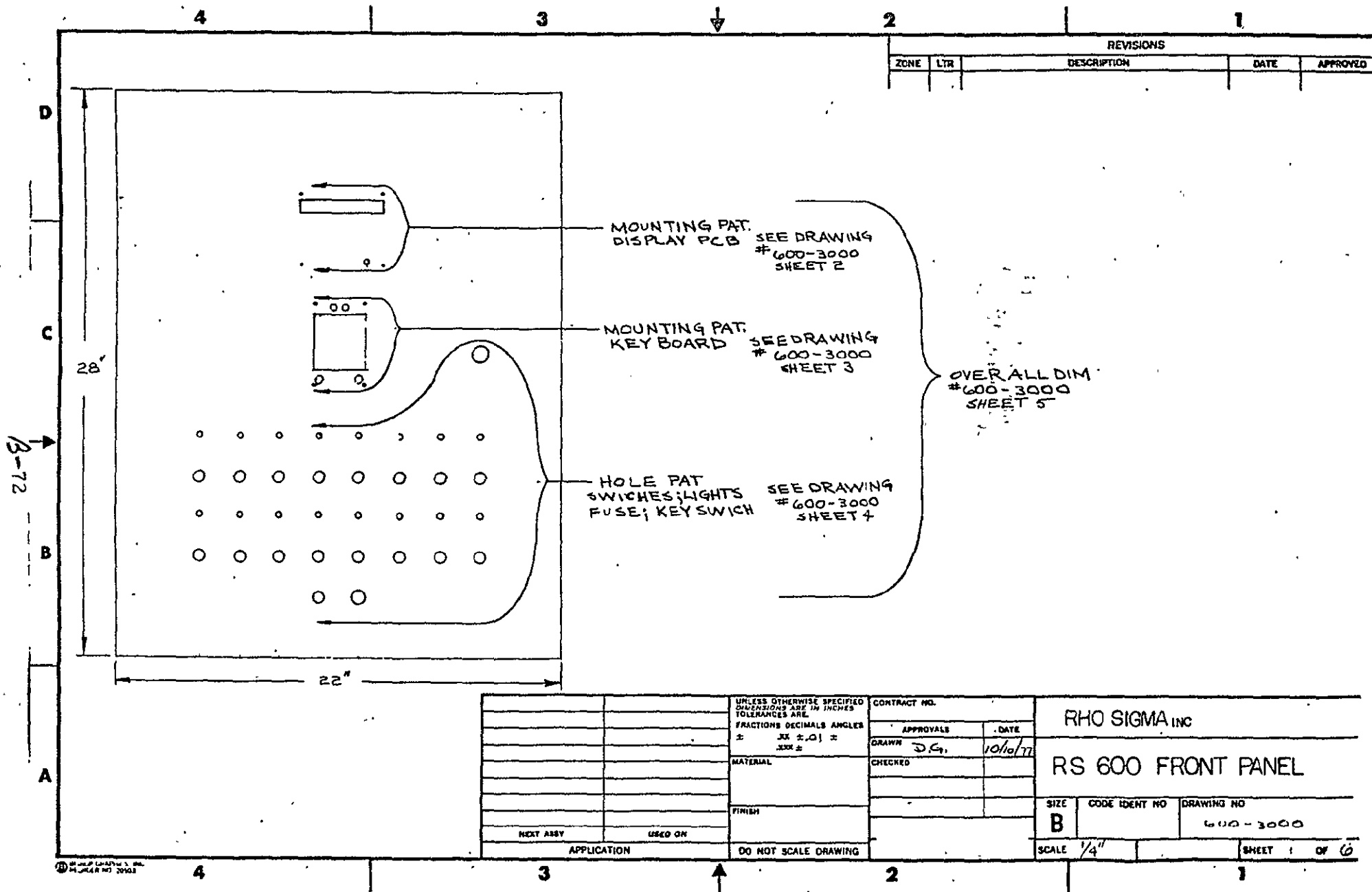
UNLESS OTHERWISE SPECIFIED		DRAWN <i>T. Shuler</i>		DATE 7/13/77	
DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS X ± .1 XX ± .03 XXX ± .010		CHK		DATE	
MATERIAL SEE LIST OF MAT'L		ENGR <i>D.W. CORBIN</i>		DATE 10-23-77	
NEXT ASSY 82		MFG		DATE	
USED ON PROGRAM CONTROLLER		PROJ. ENGR		DATE	
C'TR NO. DN-012477		APPROV.		DATE	
FAIRCHILD INSTRUMENTATION		TITLE ASSEMBLY - KEY BOARD CARD			
SIZE A		CODE IDENT NO		DVG NO 97470112	
SCALE 1/1		SHEET 1		REV 1	
B-70A		SHEET 1 OF 1			

FAIRCHILD LIST OF MATERIAL

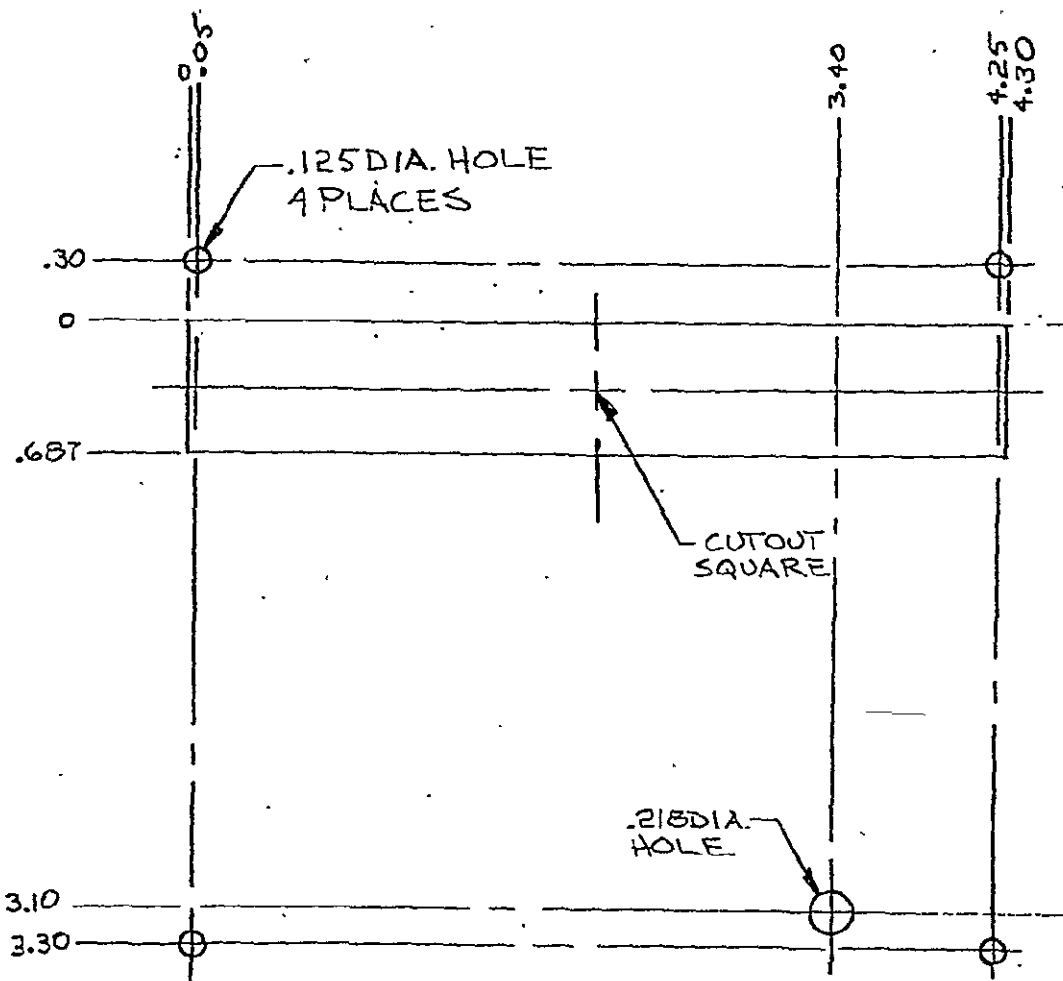
PAGE 1 OF 1

LM NO		REV	QTY	LM	DESCRIPTION	NEXT ASSY	BY	CHK	MFG ENG	DATE
97470112		-03	01		KEYBOARD ASSY		SC			
							DATE	DATE	ENGR	DATE
ITEM	PART NO	REV	QTY PER ASSM	U M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT			
							REV	EN NO		
001	40048507	01	001	01	PCB KEYBOARD					
002	26905605	01	001	01	IC 75451	QA1				
003		01	001	01	IC 74C922	QA2				
004	26904816	01	001	01	IC 4049	QA3				
005	26904823	01	001	01	IC 4001	QA4				
006	03291040	01	002	01	CAP .1MF CERAMIC DISC	C1,3				
007	03282560	01	001	01	CAP 22MF 15V TANT.	C2				
008		01	001	01	CAP 5.6MF TANT	C4				
009		00	002	01	LED, RED	DS1,2				
010	09917009	01	001	01	SOCKET, IC, 16PIN DIP	J1				
011		01	001	01	SWITCH SPDT, TOGGLE	SW1				
012		01	001	01	SWITCH SPDT, TOG., CENTER OFF	SW2				
013	02354400	01	002	01	RESISTOR, 120R 1/4 5% CTRB.	R1,2				
014		01	001	01	KEYBOARD, DIGITRAN KL	0042				
015		01	001	01	LED, GRN	DS				
016		01	001	01	RESISTOR 15K 1/4w 5%	R3				
017		01	001	01	CAP. .001MF CER.	C5				
018										
019										

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APPLICATION			REVISION		
NEXT ASSY	USED ON	LTR	DESCRIPTION	DATE	APPROVED



UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ARE:

FRACTIONS DECIMALS ANGLES
± .XX ± .01 ±
XXX ± .010

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS

DATE

DRAWN

D.G.

8/4/77

CHECKED

RHO SIGMA INC.

MOUNTING PATTERN
DISPLAY PCB

SIZE

A

CODE IDENT NO.

DRAWING NO.

600-3000

SCALE

SHEET 2

OF 6

B-73

APPLICATION

REVISION

NEXT ASSY	USED ON	LTR	DESCRIPTION	DATE	APPROVED

.495
.355

.031
.331
1.031
1.531
2.231
2.531
2.562

.218 DIA. HOLES
2 PLACES

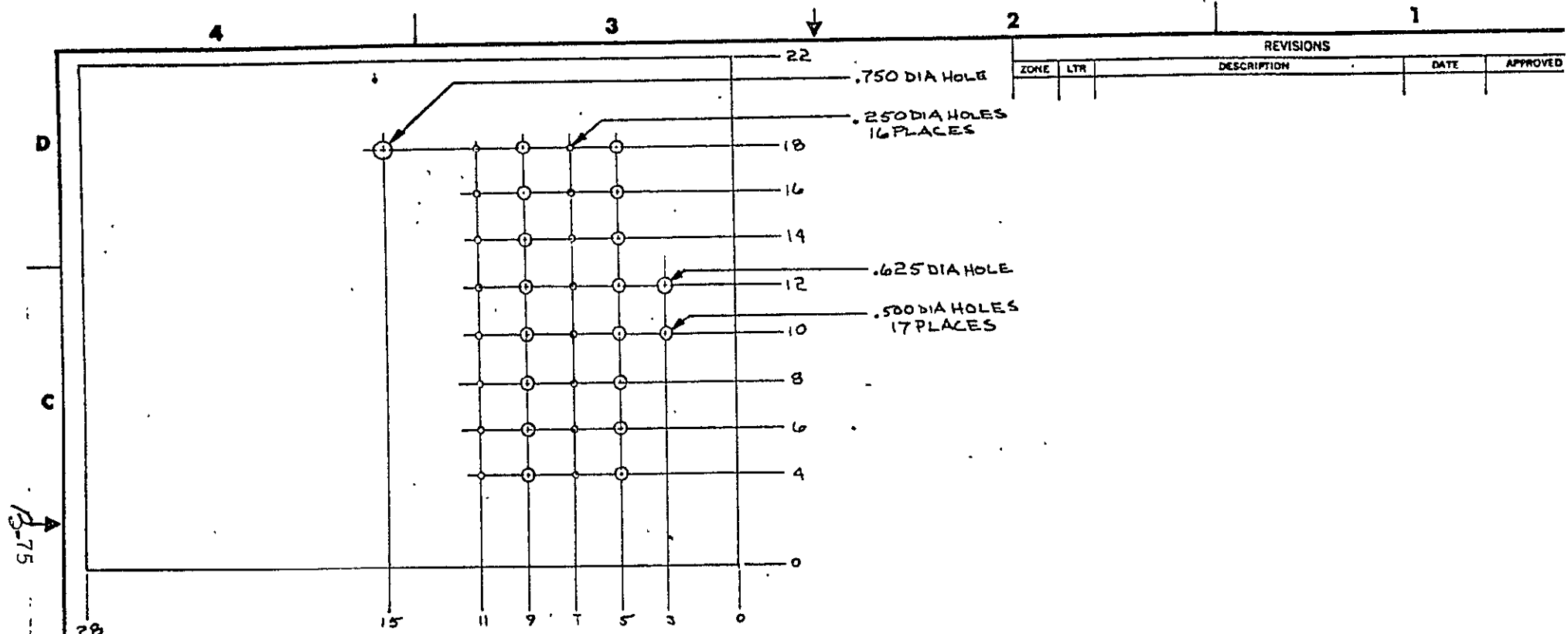
CUTOUT
SQUARE

2.75

3.295
3.555

.156 DIA HOLES
4 PLACES
.281 DIA. HOLES
2 PLACES

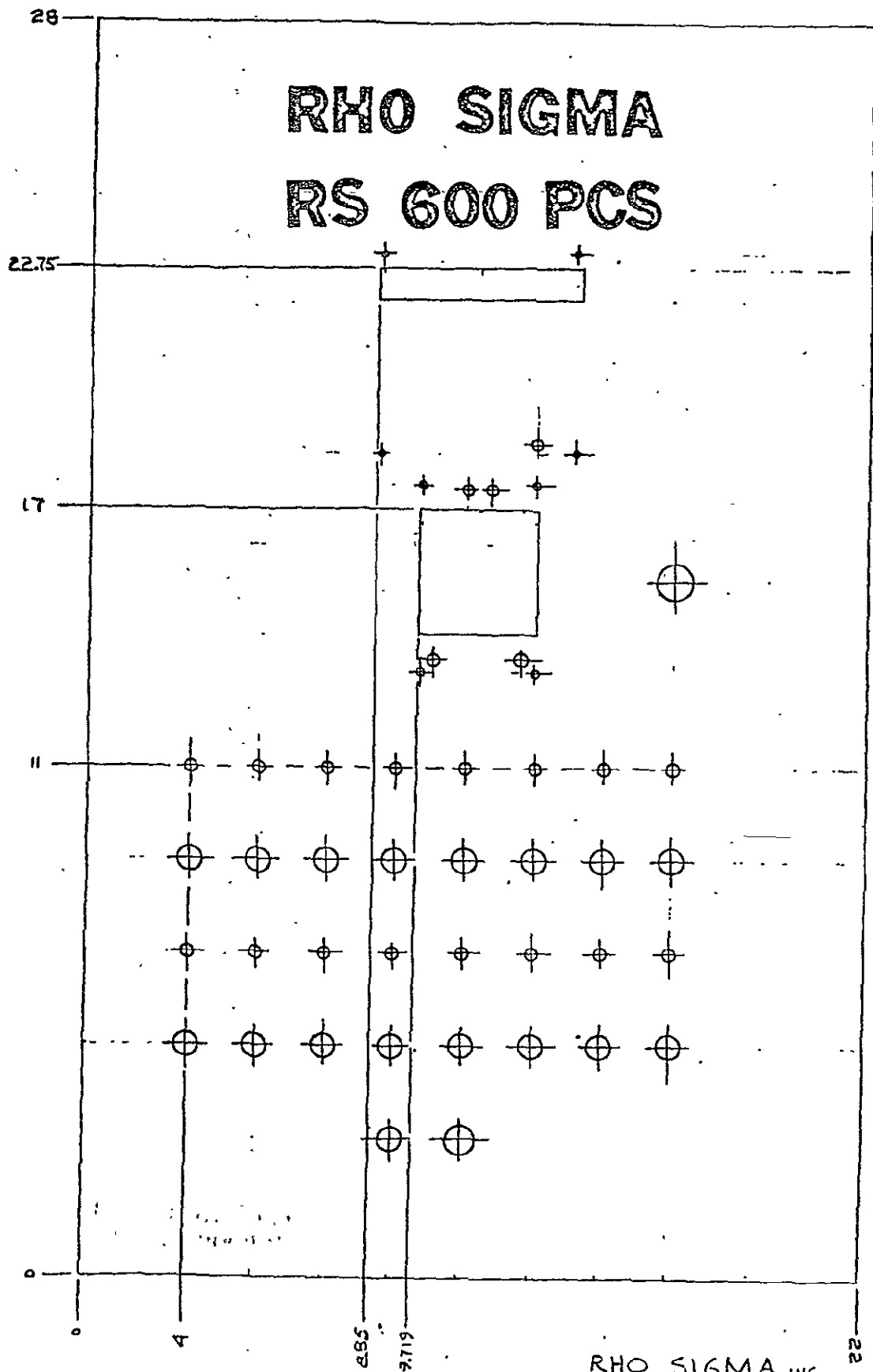
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES $\pm .XX \pm .01 \pm$ $.XXX \pm .010$	CONTRACT NO.		RHO SIGMA INC.		
	APPROVALS	DATE			
	MATERIAL	DRAWN <i>D.G.</i>		MOUNTING PATTERN KEYBOARD	
	FINISH	CHECKED			
	DO NOT SCALE DRAWING				
SCALE		SIZE A	CODE IDENT NO.	DRAWING NO. 600-3000	
		SHEET 3		OF 6	

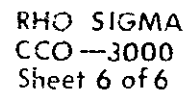


NOTE: ALL DIM. IN INCHES

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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .015 ± .005 ± .015 MATERIAL T-6 ALUM. FINISH DO NOT SCALE DRAWING		CONTRACT NO.		RHO SIGMA INC		
		APPROVALS	DATE	HOLE PAT. FOR SWITCHES; LIGHTS; FUSE; KEY-SWITCH		
		DRAWN D.G.	10/12/77			
		CHECKED				
NEXT ASSY		USED ON		SIZE	CODE IDENT NO.	DRAWING NO.
APPLICATION				B		600-3000
				SCALE 1/4"	SHEET 4 OF 6	





B-77

SECTION C

SYSTEM DESIGN DATA BROCHURE

RS600

PROGRAMMABLE CONTROL SYSTEM



RS 600 PROGRAMMABLE CONTROL SYSTEM

SEPT., 1, 1977

Rho Sigma, Inc, a leading manufacturer of solar controls, has developed the RS600 Programmable Control System (PCS) as its newest generation of controls. The RS600 is designed for use with commercial, multi-family dwelling, and complex residential HVAC systems. Its versatility allows it to be programmed to control any type system where multiple sensor inputs and control outputs are needed.

The RS600 PCS is a programmable microprocessor-based control system. It can scan sensor inputs such as temperature, pressure, flow, relay and switch closures. The controller solves the system functional equations which may be a combination of arithmetic functions, time and switch logic. The outputs can be in the form of relay closures or solid state devices which can pulse a damper system or operate fractional HP motors.

Figure 1 shows the general block diagram of the PCS. Figure 2 shows the front panel of the PCS with the keyboard/display and the output monitor and control switches.

The RS600 has a "front end conditioning" module which is designed to allow the use of thermistors as temperature sensors. There are 16 such inputs available along with 16 discrete inputs.

Mounted inside the RS600 enclosure is an optional 5 digit LED display and the 16-key keyboard as shown in Figure 2. This display will automatically sequence through all input channels or can be set to monitor one channel via the keyboard. The display is in engineering units for the analog channels. The discrete input channels will be represented by a "HI" or "LO" for "ON" and "OFF".

The display also will show the time, day of year, hour and minute. Time can be changed via the keyboard for initialization and updating in the event of start-up and power outage.

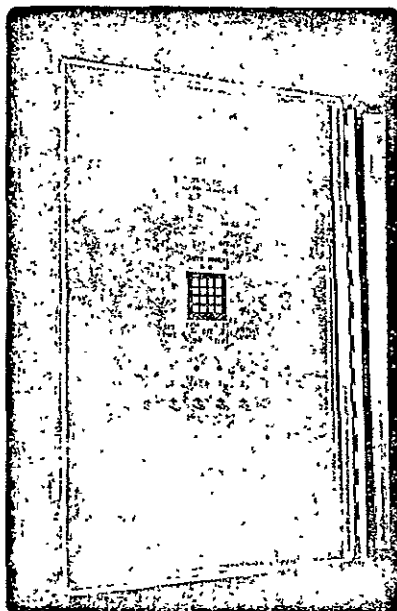


FIGURE 2

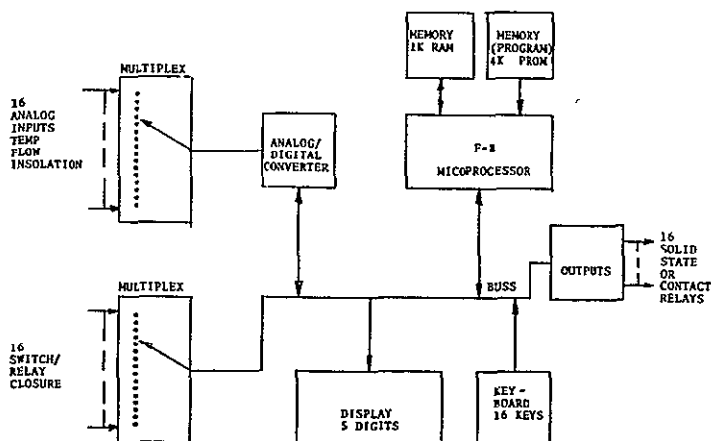
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The keyboard, besides allowing the user to monitor a particular input or output channel, can be used to change up to fifty-two (52) constants used in the programmed equations. This feature of the RS600 is ideal for prototype or first time systems. The program constants can be changed via the keyboard to modify any of the equations. In this manner system changes can be tried without any hardware modifications.

On the same panel as the display/keyboard are 16 optional LED's and 3 position toggle switches. The LED's will indicate an output in the "ON" stage; the toggle switches will allow the user to manually turn each output to either "ON" or "OFF", or to put the output in the "AUTO" state, which is then under computer control.

The RS600 has sixteen output control signals which can be used either to drive contact relays or solid state relays.

The RS600 PCS will be programmed to solve a set of logical/arithmetic equations. The equations will be contained in programmable read only memories (PROM's). The associated constants for each equation are temporarily held in the random access memory (RAM's) which will allow the user to alter and experiment with the constants via the keyboard.



RS 600
PROGRAMMABLE CONTROL SYSTEM

FIGURE 1



RS600 TECHNICAL SPECIFICATIONS

AUG. 15, 1977

RS600 PROGRAMMABLE CONTROL SYSTEM

INPUTS:

Sensors: 8 Channels expandable to 16

Sensor types:

1. Temperature — Thermistors or RTD's
2. Insolation — Photovoltaic Pyranometer
3. Flow — 0-2 VDC
4. Pressure Transducer — 0-2 VDC
5. Any analog voltage input ± 2.0 VDC

Resolution of input: 1 mv

Discrete: 8 channels expandable to 16

Sensor types:

1. Switch closure
2. Relay closure
3. Pulse flow meter — 200 pulse/min. Max.

Input signal: contact open or 5 VDC
closed — ground

Power: 105-130 VAC 50-60 Hz 100 watts

OUTPUTS: 16 channels available

Output types: (selectable by design)

1. 10 Amp solid state switch
2. 10 Amp contact relay
3. 200 ma 24 VDC relay driver

COMPUTER FUNCTIONS:

- a. Conversions of inputs to engineering units
 1. Thermistor inputs to temperature $^{\circ}\text{C}$ or $^{\circ}\text{F}$
Accuracy $0-100^{\circ}\text{C} \pm 1^{\circ}\text{C}$, -40 to $140^{\circ}\text{C} \pm 2^{\circ}\text{C}$
 $32-212^{\circ}\text{F} \pm 1^{\circ}\text{F}$, -40 to $300^{\circ}\text{F} \pm 3^{\circ}\text{F}$
 2. Photocell input to insolation ($\text{Btu}/\text{ft}^2\text{-Hr}$)
 3. Flow rates to GPM or GPH
 4. Calculates real time: 365 day clock time to nearest second.
- b. Solves logical and arithmetic equations of the type:
Output = F (temperature, time, flow, switch closure, etc.)

PHYSICAL SIZE:

- a. 30 in. high x 20 in. wide x 10 in. deep enclosure
(NEMA — 12 type)
- b. Approximate weight- 80 lbs.

ENVIRONMENT:

Controller will operate from 0° to 120°F
and from 0 to 95% Rh without condensation

OPTIONS:

Keyboard:

Mounted on the inner panel, allows the user to

1. Select input channels for continuous monitoring
2. Set time
3. Alter specified constants used in the program
4. Set/reset outputs

Display:

A 6-digit LED display mounted on the inner panel. The display will either sequence through all inputs or monitor one input or output continuously (via keyboard command). 12 symbols designate the type of data being displayed.

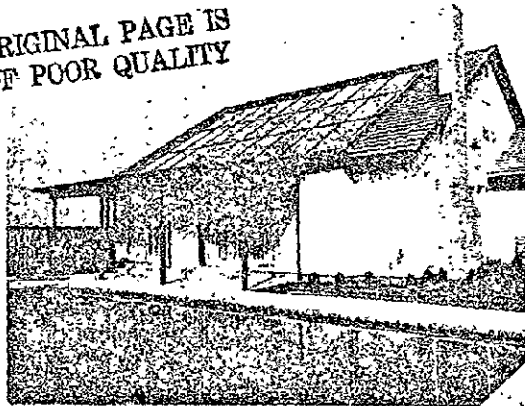
Manual Override Switches:

Each output has a 3-position switch that allows the user to select the on-off-auto state for each output. A LED designates the outputs ON/OFF state.

PROGRAMMABLE DATA ACQUISITION SYSTEMS

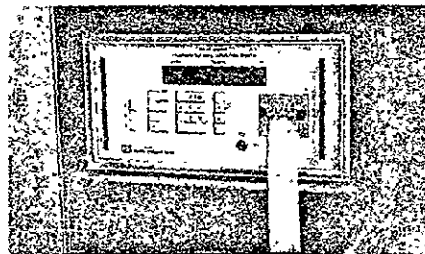
for Energy-related Engineering Studies.

ORIGINAL PAGE IS
OF POOR QUALITY



One of PG&E's three Solar Energy conservation homes. This one is heated by Solaron; all three are instrumented by Rho Sigma.

See Reverse Side for
Technical Specifications



Microprocessor on-site at the Pacific Gas & Electric Company's Solar Energy Conservation Home, (San Jose, CA). Rho Sigma is instrumenting two additional homes in PG & E's ambitious solar program designed to study how the energy of the sun may become one part of the solution to the nation's problem of diminishing supplies of natural gas.

Rho Sigma is a complete, single source for controls and instrumentation designed specifically for the solar energy industry. Our in-field experience and close customer-contact has guided the development of our product lines and has resulted in the increasing selection of Rho Sigma's solar controls and instruments to meet the special needs of our customers.

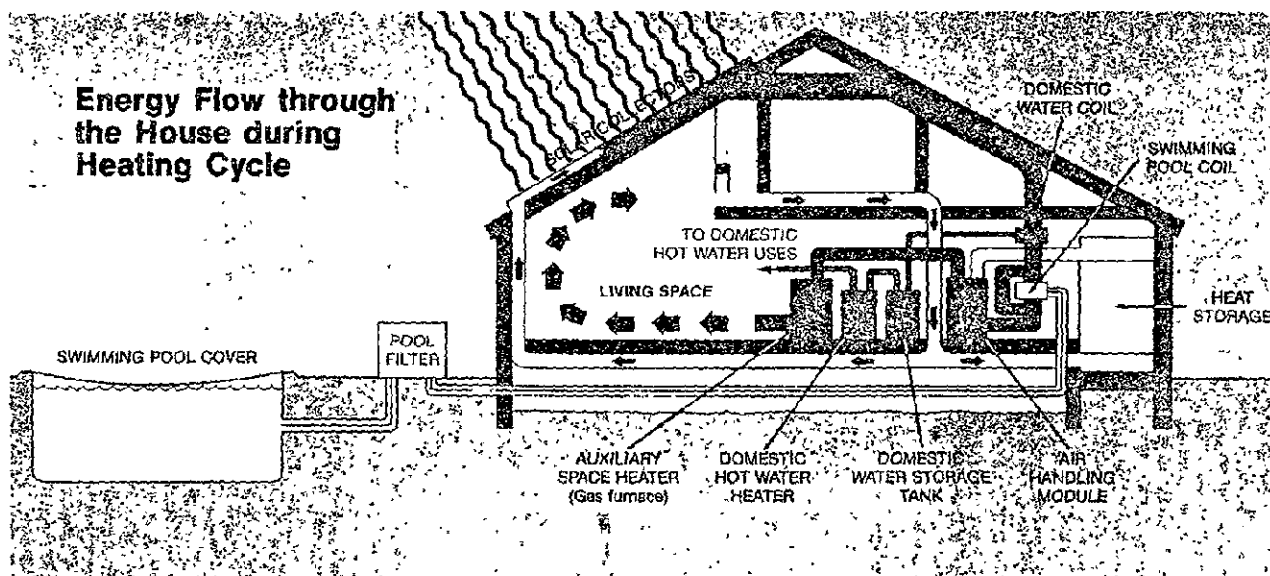
For example, Rho Sigma's Programmable Data Acquisition Systems (PDAS), is monitoring all the energy-related parameters in the Pacific Gas & Electric Company's three-house solar energy evaluation program. The RS5080 was programmed to PG & E's specifications. Rho Sigma also supplied all the sensors necessary to measure the temperatures, flow rates, energy consumption of various back-up systems, and the meteorological conditions of interest to engineers at PG & E. Installation of the package by Rho Sigma's field engineers assured turn-key operation for PG & E.

During the *three year* monitoring period, the RS5080 is providing PG & E with answers to the following questions:

- 1.) How much energy is consumed by the house?
- 2.) What percentage of the total is supplied by the solar system?
- 3.) How much energy is consumed to heat domestic water, space and the swimming pool?
- 4.) What percentage of the energy used for each purpose comes from solar sources?
- 5.) What is the efficiency of the collectors under conditions actually encountered in residential applications?

Rho Sigma's solar controls are in the field regulating the conversion of solar energy to forms useful to man. Rho Sigma's instruments are at the sites answering the questions which are under study.

Energy Flow through the House during Heating Cycle





TECHNICAL SPECIFICATIONS RS5080

JANUARY 31, 1977

Inputs:

- 1.) 20 analog channels to monitor
 - a) Temperature inputs from RTD's, thermocouples and thermistors, and
 - b) Solar inputs from pyranometers
- 2.) 5 pulsed inputs (expandable in groups of five) to monitor
 - a) flowmeters and
 - b) instrumented gas and watt-hour meters
- 3.) 8 discrete inputs to monitor
 - a) relay closures signaling states of operation and
 - b) switch positions

Outputs:

- 1.) broad-stroke LED display of all inputs in either engineering units or raw data
- 2.) printer output of
 - a) all inputs,
 - b) energy flow calculations based on inputs,
 - c) performance efficiencies, and
 - d) other energy-related quantities of interest to engineers.
- 3.) capability to interface with
 - a) cassette record
 - b) teletype terminal
 - c) acoustical coupler (telephone)

Internal Capabilities:

- 1.) scans all channels once per second,
- 2.) solves energy flow equations once per minute,

Typical equations:

$$Q = C_p \int \dot{m} \Delta T dt$$

$$Q = \text{Area} \int \text{Insolation (T)} dt$$

- 3.) solves performance efficiency formulas at each customer-selected print-out time.

Typical formulas:

$$\eta_{\text{collector}} = \frac{Q_{\text{collector}}}{Q_{\text{solar}}}$$

$$\% \text{ solar} = \frac{Q_{\text{solar}}}{Q_{\text{solar}} + Q_{\text{back-up}}}$$